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1922 Prepares for 1923

BY C. J. STARK

NORMAL business progress was resumed in 1922. In brief, this is the outstanding contribution to the commercial development of the nation that is to be drawn from the activities and events of the past year. Not since 1913 has the trend of fundamental conditions been more unmistakably in the direction of sound and orderly business development. The war years manifestly may be set aside as periods of abnormal stimulation and of distorted standards of commerce. In 1919 the effect of the terrific revulsion of industry geared to the highest pitch of war speed, suddenly reduced to a peacetime basis, left initiative dulled and achievement stifled. Then followed the wild inflation of 1920 which rendered the business structure so vulnerable to the collapse in 1921 to the lowest depths of depression that modern history can record. Now 1922 has come along bringing into play once more the inherent qualities of energy, resourcefulness and persistent courage of an enterprising people.

In no sense is the past year to be adjudged a satisfactory one. Actually, it was disappointing in financial returns, stabilized values and efficient production which comprise true prosperity. No 12-month period in recent times has been so replete with unsettling and obstructive factors. For this situation, nationwide strikes, particularly the prolonged cessation in the coal mining industry, largely were responsible. The coal strike stands forth as the most disastrous single influence of the year industrially. The attendant consequences served to bolster temporarily perhaps, passing wartime standards of wages and service and to emphasize the termination of the cycle of healthy deflation extending over eighteen months. Their effect was to give impetus to a period of secondary inflation of production costs. How far this new movement is to run will determine the economic solidity of industrial conditions of the near future.

The iron and steel industry definitely has set its face to the future. No industry has shown in a more substantial way, the revival of faith and courage. More new capacity in iron and steel was laid down and more plans for extensions formulated in 1922 than in any year since the war. The country at large and especially its industrial life may take guidance from this tested leadership in preparing for the opportunities of tomorrow.

Measured critically by its record of business achievement, 1922 stands forth essentially as a period of preparation; 1923 should prove to be one of realization.

Railroads Use Most Steel in 1922

Iron Trade Review's Second Annual Analysis of Steel Consumption by Principal Groups Show Some Interesting Facts Concerning Demands of Past Year—Official Returns Received from 70.88 Per Cent of Producing Capacity

BY E. C. KREUTZBERG

IN THE distribution of the finished rolled steel output of the country during 1922, the railroads overwhelmingly took first rank. Figures compiled by IRON TRADE REVIEW, from reports from 26 steel companies representing 70.88 per cent of the country's ingot capacity, indicate that these companies took 24.84 per cent of the finished rolled steel output for the year.

The next important consuming field during 1922 was the group comprising requirements for the production, transportation and storage of oil, gas and water. This great division of the country's requirements rose to unprecedented prominence during the past year, absorbing 14.84 per cent of the finished rolled steel produced.

Third place is occupied by the requirements for all buildings and bridges aside from railroad structures. This group consumed 11.84 per cent of the finished steel output during 1922.

Automotive requirements, including the steel for motor cars, motor trucks, tractors, airplanes, etc., took fourth place with a total of 8.98 per cent. Exports took fifth place, accounting for 7.82 per cent of the total output. The food container industry reached large proportions, occupying sixth place with 4.16 per cent of the total.

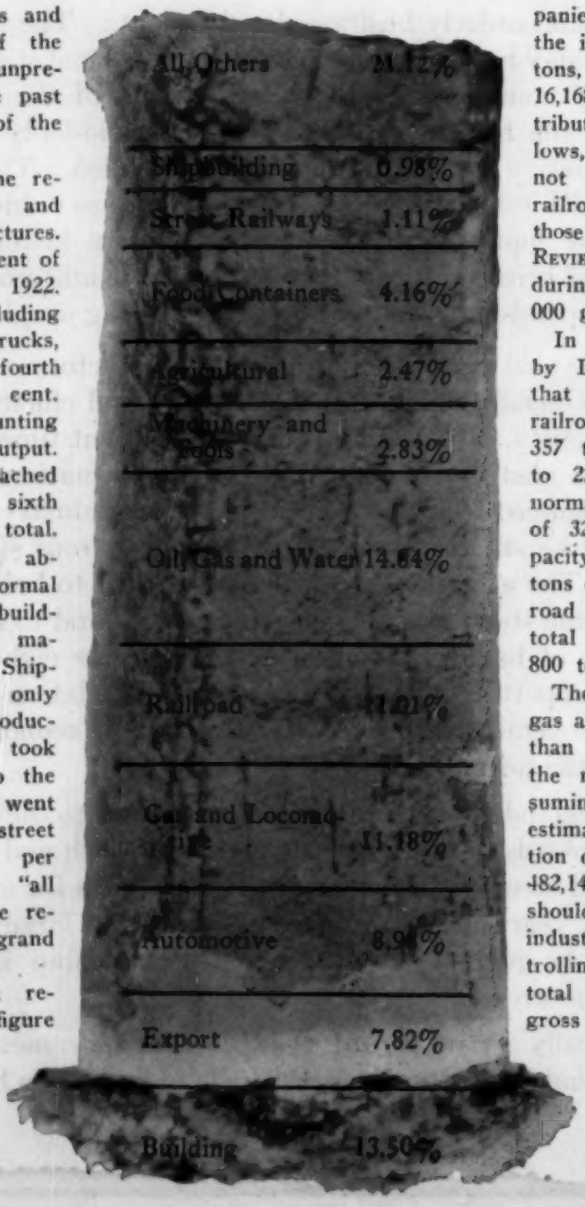
Among the industries which absorbed much less than their normal proportion of steel were the shipbuilding, agricultural equipment and machinery and hand tool industries. Shipbuilding during the year required only 0.98 per cent of the total. Production of agricultural equipment took 2.47 per cent of the total. To the machinery and hand tool field went 2.83 per cent. The demands of street railway construction were 1.11 per cent. The tonnage reported in "all other requirements" embraced the remaining 21.12 per cent of the grand total of the year's distribution.

Railroad purchases were not reported by producers as a single figure and the 24.84 percentage represents the total of the various forms of railroad consumption which have been included. The railroads took 3,856,718 gross tons of finished steel for railroad structural, track work, for cars and locomotives from 26 companies controlling 70.88 per cent of the total ingot capacity. To this total must be added the railroad percentage of the steel that went into machinery and hand tools. Of the 457,338 gross ton reported by these companies as having gone into machinery and hand tools during 1922, it may be figured that approximately 35 per cent, or 160,068 gross tons, went directly or indirectly to the railroads. The railroad total for 1922, therefore, reported by companies controlling 70.88 per cent of the ingot capacity was 4,016,786 gross tons, or 24.84 per cent of the total of 16,168,549 gross tons of steel distributed by these companies. It follows, therefore, that if the companies not reporting supplied steel to the railroads in the same proportion as those making returns to IRON TRADE REVIEW, railroad consumption in all during 1922 was approximately 5,667,000 gross tons.

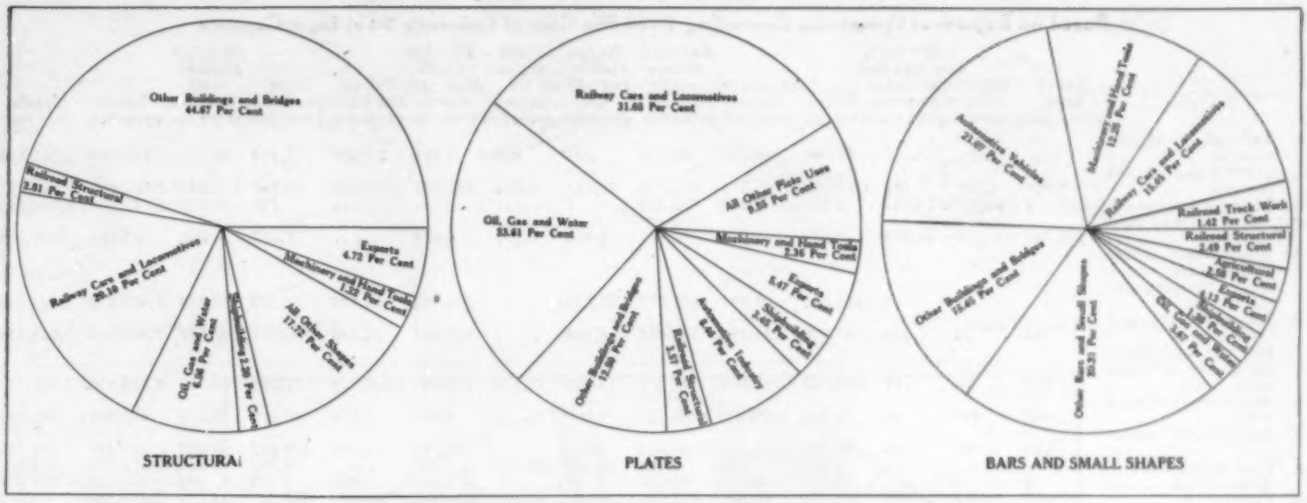
In this connection it was estimated by IRON TRADE REVIEW last January that the normal requirements of the railroads could be regarded as 6,355,357 to 6,810,714 gross tons, or 19.86 to 22.57 per cent of the country's normal finished rolled steel capacity of 32,000,000 gross tons. On a capacity production of 32,000,000 gross tons of finished material, the 1922 railroad portion of 24.84 per cent of the total would be approximately 8,948,800 tons.

The 1922 requirements for the oil, gas and water group were much larger than previously had been considered the normal proportion for this consuming division. Last year it was estimated that of a capacity production of 32,000,000 gross tons, tons, 2,482,142 gross tons or 7.75 per cent should go to the oil, gas and water industry. During 1922, companies controlling 70.88 per cent of the country's total ingot capacity supplied 2,398,910 gross tons to this consuming group. If the remaining companies furnished steel in the same proportion, the finished rolled total that went into oil, gas and water requirements during 1922 was approximately 3,384,450

HOW the steel output of the country was divided among principal consuming industries in 1922 is shown graphically by the apportionment of the ingot below. A similarly apportioned ingot on the opposite page shows the estimated normal relationships of the various groups as determined by IRON TRADE REVIEW *one year ago.*



Steel Shape, Plate and Bar Consumption in 1922 Is Divided


Other Buildings and Bridges 44.87 Per Cent
Railroad Structural 3.81 Per Cent
Exports 4.72 Per Cent
Machinery and Hand Tools 4.28 Per Cent
Railway Cars and Locomotives 20.19 Per Cent
All Other Shapes 11.72 Per Cent
Oil, Gas and Water 6.68 Per Cent
Shipbuilding 2.38 Per Cent
STRUCTURAL
Railway Cars and Locomotives 31.01 Per Cent
All Other Plate Uses 8.81 Per Cent
Oil, Gas and Water 23.41 Per Cent
Machinery and Hand Tools 2.36 Per Cent
Exports 8.47 Per Cent
Shipbuilding 2.45 Per Cent
Automotive Industry 4.89 Per Cent
Railroad Structurals 3.57 Per Cent
Other Buildings and Bridges 12.88 Per Cent
PLATES
Automotive Vehicles 23.57 Per Cent
Machinery and Hand Tools 12.28 Per Cent
Railway Cars and Locomotives 13.06 Per Cent
Railroad Track Work 1.42 Per Cent
Railroad Structural 2.48 Per Cent
Agricultural 3.58 Per Cent
Exports 4.13 Per Cent
Shipbuilding 1.26 Per Cent
Oil, Gas and Water 3.67 Per Cent
Other Bars and Small Shapes 10.51 Per Cent
Other Buildings and Bridges 12.41 Per Cent
BARS AND SMALL SHAPES

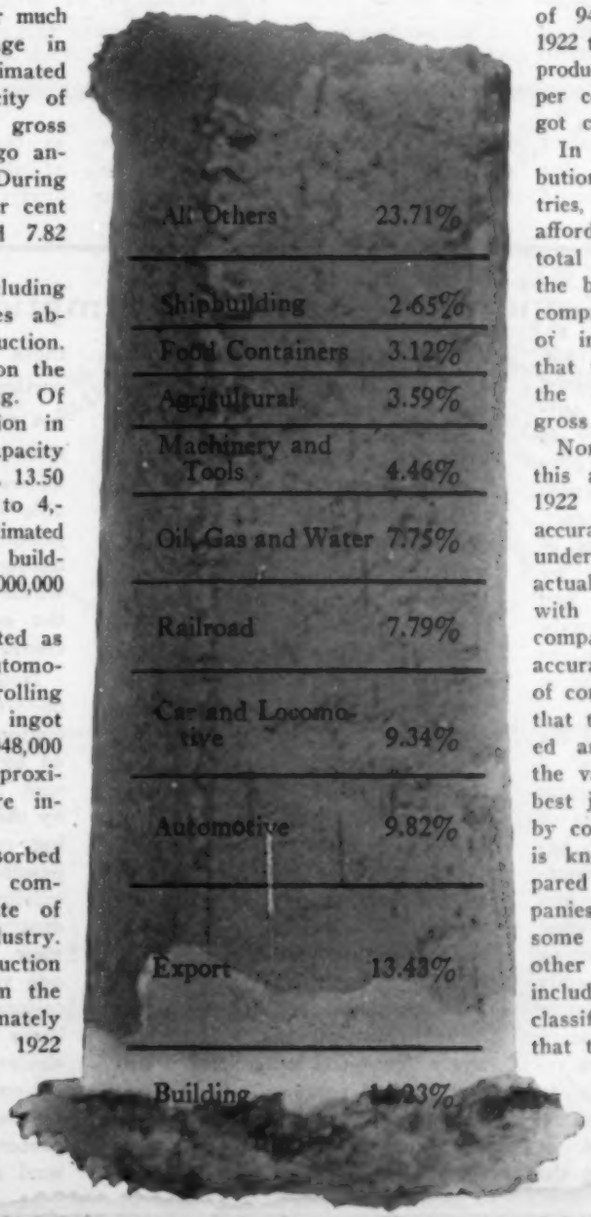
tons. Export demand accounted for much less than its normal percentage in 1922. A year ago it was estimated that of the total finished capacity of 32,000,000 gross tons, 4,299,107 gross tons or 13.43 per cent, should go annually into the export field. During 1922, companies having 70.88 per cent of the ingot capacity exported 7.82 per cent of their output.

Total building in 1922, including railroad and all other structures absorbed 13.50 per cent of production. This represented 2,182,647 tons on the basis of the companies reporting. Of the full indicated steel production in 1922 it was 3,080,000. Had capacity production been obtained in 1922, 13.50 per cent would have amounted to 4,320,000. One year ago it was estimated that the normal requirements for building work were approximately 5,000,000 tons annually.

The 1,451,632 gross tons reported as having been shipped to the automotive industry by companies controlling 70.88 per cent of the country's ingot capacity, may be expanded to 2,048,000 gross tons to represent the approximate total taken by that entire industry during 1922.

Machinery and hand tools absorbed 457,338 gross tons for the 26 companies reporting or at the rate of 645,200 tons for the entire industry.

Agricultural implement production absorbed 399,607 gross tons from the companies reporting, or approximately 563,800 gross tons of the total 1922 output. The food container industry in accounting for 672,770 gross tons from 70.88 per cent of the industry, may be estimated as approximating a total consumption for the year of 949,200 gross tons. Shipbuilding in 1922 took 158,106 gross tons from various producing interests representing 70.88 per cent of the country's total steel ingot capacity.



In addition to showing the distribution of steel by consuming industries, IRON TRADE REVIEW'S study also affords a close approximation of the total finished steel output for 1922. On the basis of 16,168,549 gross tons for companies possessing 70.88 per cent of ingot capacity, it would appear that the total finished steel output of the country was around 22,811,000 gross tons in 1922.

None of the figures set forth in this analysis of steel consumption in 1922 are to be regarded as strictly accurate. When IRON TRADE REVIEW undertook to secure information on actual distribution during 1922, it was with the realization that very few companies were in a position to make accurate reports because of the lack of complete records. It was requested that the figures should be approximated as closely as possible and that the various companies should use their best judgment in making the divisions by consuming classifications. While it is known that the figures were prepared with care by most of the companies reporting, it is not unlikely that some of the tonnage included in "All other requirements" should have been included in one or more of the other classifications. In fact, it is likely that the "All other" classification may contain some steel which went into the manufacture of bolts, nuts, rivets or other products which the steel manufacturers were unable to trace down to the ultimate consuming classi-

Distribution by Percentage of Output of Finished Steel in 1922

Shown by Consuming Groups and by Individual Product

Based on Reports of Companies Controlling 70.88 Per Cent of Country's Steel Ingot Capacity

	Heavy rails, gross ton	Light rails, gross ton	Angle bars, steel ties and other track accessories, gross ton	Plates, gross ton	Structural shapes, gross ton	Bars and shapes under 3-inch, gross ton	Hoops, bands and cotton ties, gross ton	Black plates for tinning, gross ton	All other black plate and sheets, gross ton	Tubing and pipe, gross ton	Wire products, gross ton	All other finished steel products, gross ton	Totals, gross ton	Totals, net ton
1. Railroad structural material	.....	.....	.....	84,606	46,835	62,132	301	734	3,987	23,000	21,164	26,305	269,064	301,352
2. Other buildings and bridges	1,984	1,085	562	296,899	745,532	385,703	39,763	6,606	129,143	130,536	59,548	116,222	1,913,583	2,143,213
3. Railroad track work	1,267,508	24,087	414,788	6,448	244	35,335	4	.....	.....	.....	705	31,451	1,780,570	1,994,238
4. Street railway construction	110,381	390	12,948	3,814	251	7,451	2,412	.....	6,974	.....	7,057	26,990	178,668	200,108
5. Automotive vehicles (motor cars, motor trucks, tractors, airplanes, etc.)	.....	41	3	200,821	21,977	525,777	81,858	.....	501,992	18,900	74,533	25,730	1,451,632	1,625,828
6. Railway cars and locomotives	186	21	326	737,220	335,487	385,687	8,504	.....	120,421	32,288	19,197	167,747	1,807,084	2,023,934
7. Oil, gas and water requirements (pipe, tanks, etc.)	134	19	29	560,969	109,406	91,524	14,388	10,816	172,485	1,336,179	72,205	30,756	2,398,910	2,686,779
8. Machinery and hand tools	187	840	50	56,018	20,410	305,731	9,965	.....	5,079	3,303	46,579	9,176	457,338	512,219
9. Agricultural equipment	604	60	64	20,941	13,437	64,545	6,820	.....	25,728	9,000	248,985	9,423	399,607	447,560
10. Food containers	.....	.....	.....	3,855	125	6,410	38,443	606,217	1,295	.....	16,300	125	672,770	753,502
11. Shipbuilding	8	13	.....	81,877	36,725	32,049	70	.....	4,987	900	1,371	106	158,106	177,079
12. Exports	221,435	31,528	19,498	129,975	78,821	103,034	16,460	62,670	254,480	110,419	223,825	14,197	1,266,342	1,418,303
13. All other requirements	18,579	77,553	24,894	191,743	259,779	490,430	69,092	147,869	548,196	444,110	842,775	299,855	3,414,875	3,824,660
Totals, gross tons	1,621,006	135,637	473,162	2,375,186	1,669,029	2,495,808	288,080	834,912	1,774,767	2,108,635	1,634,244	758,083	16,168,549	
Totals, net tons	1,815,527	151,913	529,941	2,660,208	1,869,312	2,795,305	322,650	935,101	1,987,739	2,361,672	1,830,354	849,053		18,108,775

fication. It became apparent also, after the work had been gotten under way that a better classification probably could be devised than that used in the present study. As the compilation stands, however, its figures may be taken as the best approximation obtainable at this time. Undoubtedly, as the study is pursued more perfect results

Iron Trade Review Develops Consumption Statistics

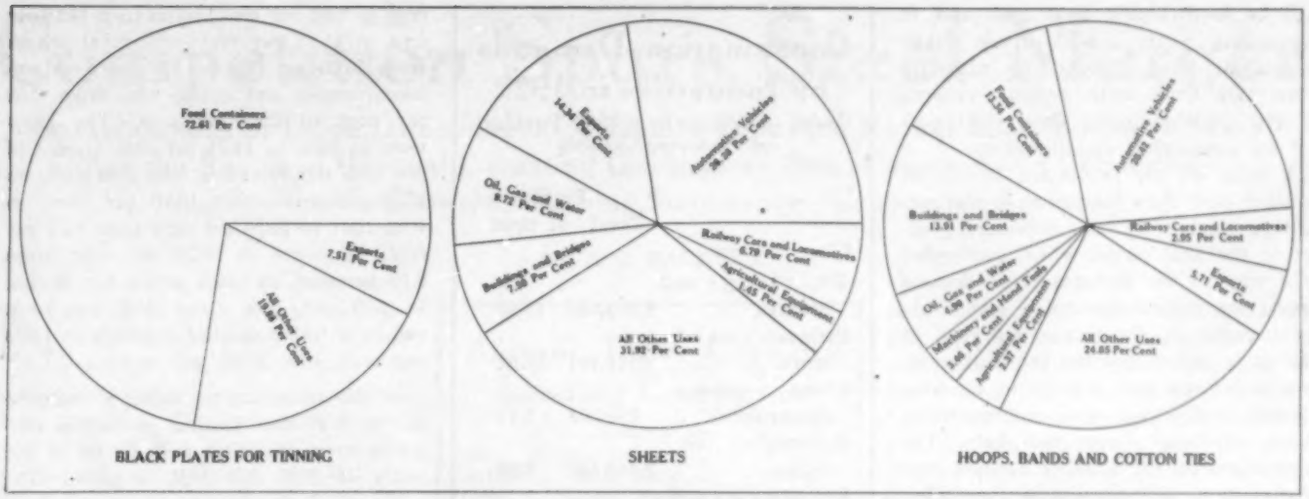
ONE year ago Iron Trade Review undertook to show how the finished steel output of the country normally is distributed to the important consuming industries. The figures were not set forth as being exact, as up to that time no survey of the entire steel distribution by consuming classifications ever had been made. The figures merely represented the best estimates which it was possible to make at that time.

Following the publication of the "normal distribution figures" a year ago, there developed a great deal of interest in this subject of distribution. The distribution figures were used before the Interstate Commerce commission and in many other ways. Many steel companies wrote letters requesting additional information. It speedily became apparent that a beginning had been made in an investigation which might be developed with resulting great value not only to steel producers and consumers, but to the public as a whole. It was proposed, therefore, that the next effort in this direction should be a compilation, not of estimates, but of actual shipments by consuming groups.

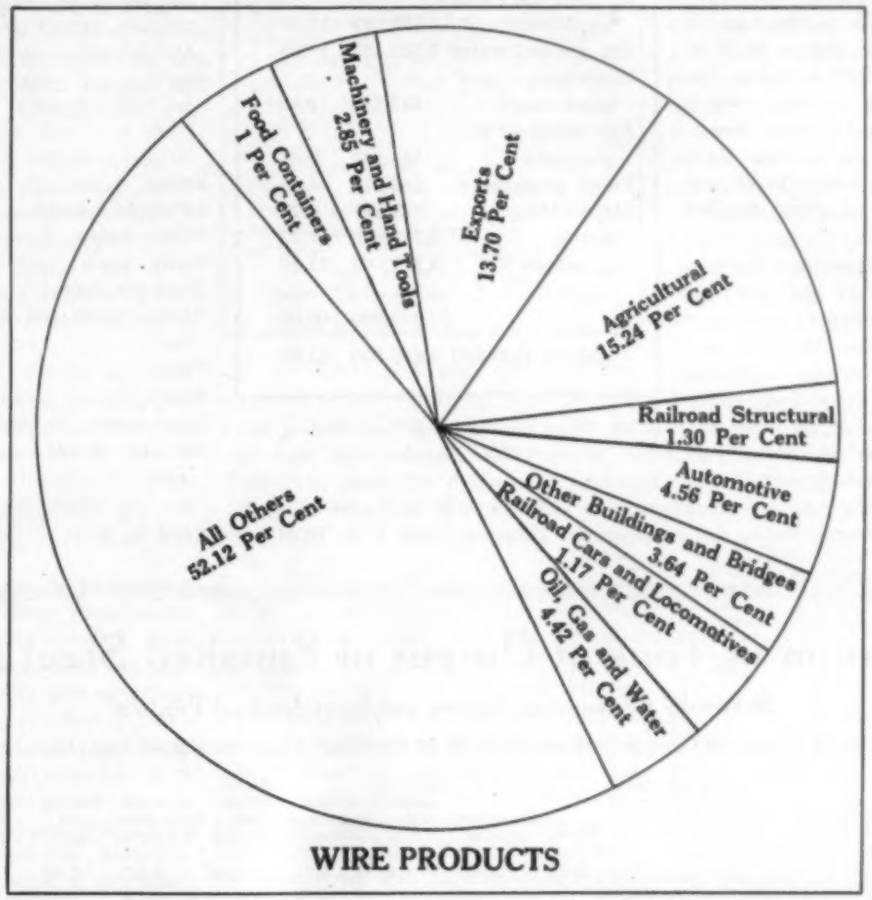
In April, Iron Trade Review submitted this proposition to the directors of the American Iron and Steel institute for approval, with the result that favorable action was taken by that body. Assurances of co-operation also were obtained from many important steel companies. In November, therefore, Iron Trade Review sent out forms to all of the principal steel producers, with the request that they report, by consuming classifications, their estimated total 1922 finished steel output. These companies were asked to include all of their output with the exception of semifinished steel sold for further conversion into finished rolled products.

In response, reports were received from all but a comparatively few steel companies. Unfortunately, some of the reports did not show divisions by consuming classifications and sufficient time has not been available for these to be returned for further particulars. Other reports were not received in time for use. Despite some necessary eliminations, however, Iron Trade Review is able to present herewith a compilation of the steel distribution during 1922 of 26 steel companies which control 70.88 per cent of the entire ingot capacity of the country.

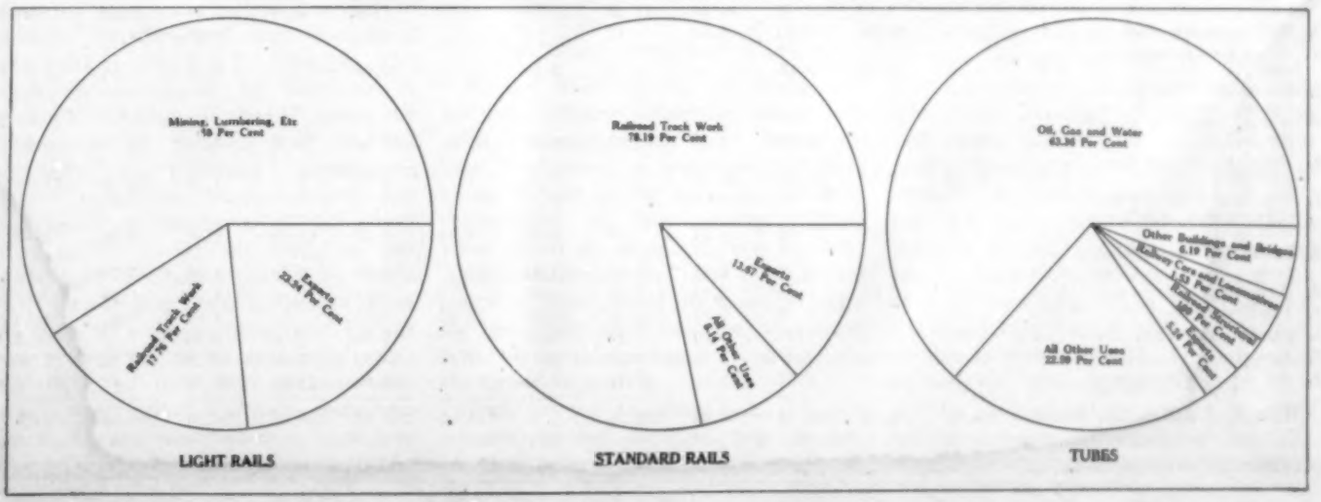
Iron Trade Review takes this opportunity to express its appreciation of the co-operation extended by the directors of the American Iron and Steel institute and by the many steel companies making reports, which have made possible a valuable addition to the existing statistics of the steel industry. Likewise Iron Trade Review here repeats what was said one year ago and on various occasions since, that it proposes to carry forward year by year the analysis of the distribution of steel by consuming industries, which it originated in 1921 and has been presenting exclusively in its annual statistical number.


Food Containers 72.61 Per Cent
Exports 7.51 Per Cent
All Other Uses 19.88 Per Cent
BLACK PLATES FOR TINNING
Exports 14.34 Per Cent
Automotive Vehicles 28.29 Per Cent
Oil, Gas and Water 8.72 Per Cent
Buildings and Bridges 7.50 Per Cent
Railway Cars and Locomotives 6.79 Per Cent
Agricultural Equipment 1.65 Per Cent
All Other Uses 31.92 Per Cent
SHEETS
Food Containers 12.54 Per Cent
Automotive Vehicles 28.42 Per Cent
Buildings and Bridges 13.91 Per Cent
Railway Cars and Locomotives 2.95 Per Cent
Exports 5.71 Per Cent
Oil, Gas and Water 6.59 Per Cent
Machinery and Hand Tools 3.46 Per Cent
Agricultural Equipment 2.37 Per Cent
All Other Uses 24.05 Per Cent
HOOPS, BANDS AND COTTON TIES

Charts Showing How Certain Finished Steel Products Are Distributed


Food Containers 1 Per Cent
Machinery and Hand Tools 2.85 Per Cent
Exports 13.70 Per Cent
Agricultural 15.24 Per Cent
Railroad Structural 1.30 Per Cent
Automotive 4.56 Per Cent
Other Buildings and Bridges 3.64 Per Cent
Railroad Cars and Locomotives 1.17 Per Cent
Oil, Gas and Water 4.42 Per Cent
All Others 52.12 Per Cent
WIRE PRODUCTS

Railroad, Mining, Oil and Food Industries Are Leading Consumers


Mining, Lumbering, Etc 50 Per Cent
Railroad Track Work 17.76 Per Cent
Exports 32.24 Per Cent
LIGHT RAILS
Railroad Track Work 78.19 Per Cent
Exports 13.67 Per Cent
All Other Uses 8.14 Per Cent
STANDARD RAILS
Oil, Gas and Water 63.36 Per Cent
Other Buildings and Bridges 6.19 Per Cent
Railway Cars and Locomotives 1.63 Per Cent
Agricultural Equipment 1.02 Per Cent
Exports 5.79 Per Cent
All Other Uses 22.00 Per Cent
TUBES

will be forthcoming next year and in succeeding years since certain large companies have decided to maintain from this time forth regular records of the distribution of their steel output by consuming classifications.

A study of the production figures of finished steel show variances in the percentage relation of the individual product to the total output which correspond in a way to the fluctuations of demand among the various consuming groups. As an example, in the prosperous year of 1920 it is shown that the principal products in demand with relation to the total finished steel output were merchant bars, plates, structural shapes and skelp. The percentages of the total of finished steel production in 1920 supplied by these various products were 20.75 in the case of merchant bars, 14.60 in plates, 10.20 in structural shapes and 10.10 in skelp. The percentages of the other leading products for that year were as follows: Sheets, 9.75, wire rods, 9.75, rails, 8.10, black plates for tinning, 4.50, hoops, bands and cotton ties, 2.50 and all other finished products, 10.50.

Some interesting changes from the proportionate relationship of the different products to the total output are shown in the 1921 figures of production covering a period of poor business conditions in the steel industry. Those lines showing gains in percentage of the total finished output from the preceding year were rails, wire rods, skelp, sheets and black plates for tinning; those which lost ground were structural shapes, merchant bars, hoops, bands and cotton ties and plates. The sharpest loss was in merchant bars which fell from 20.75 per cent in 1920 to 10.59 per cent in 1921. Structural shapes declined from 10.20 per cent to 8.61 per cent; plates from 14.60 per cent to 11.23 per cent; structural shapes from 10.20 per cent to 8.61 per cent and hoops, bands and cotton ties from 2.50 per cent to 2.10 per cent. The gains were in rails to 14.74 per cent from 8.10 per cent the preceding year; in skelp to 13.06 per cent from 10.10 per cent; in wire rods to 10.59 per cent from 9.75 per cent, in sheets to 10.23 per cent from 9.75 per cent, in black plates for tinning to 6.09 per cent from 4.50 per cent, and in all other finished products to 11.48 per cent from 10.50 per cent.

In the accompanying table, a comparison by individual finished product in percentages of the total mill output in the years of 1920 and 1921 is given. The increases of the proportionate tonnages of several products in the poor production year of 1921 as against the good year of 1920 are set forth concisely as follows:

	1920 Per Cent	1921 Per Cent
Rails	14.74	8.10
Structural shapes	8.61	10.20
Wire rods	10.59	9.75
Skelp	13.06	10.10
Merchant bars	10.59	20.75
Hoops, bands and cotton ties	2.10	2.50
Plates	11.23	14.60
Sheets	10.23	9.75
Black plates for tinning	6.09	4.50
All other finished products	11.48	10.50
Total	100.00	100.00

Consumption Demands by Industries in 1922

Based on Returns from 70.88 Per Cent of Producing Capacity

Gross Tons

Classification	Total	Percentage of total
Buildings and bridges	3,079,485	13.50
Railroad track work	2,511,491	11.01
Street railway construction	253,202	1.11
Automotive vehicles	2,048,427	8.98
Railway cars and locomotives	2,550,269	11.18
Oil, gas and water	3,385,152	14.84
Machinery and hand tools	645,551	2.83
Agricultural implements	563,431	2.47
Food containers	948,937	4.16
Shipbuilding	223,547	0.98
Exports	1,783,820	7.82
All others	4,817,683	21.12
	22,811,000	100.00
Total all railroad	5,667,000	24.84

Distribution in Tons of Output of Finished Steel in 1922

Shown by Consuming Groups and by Individual Product

Based on Reports of Companies Controlling 70.88 Per Cent of Country's Steel Ingot Capacity

	Heavy rails	Light rails	Angle bars, steel ties and other track accessories	Plates	Structural shapes	Bars and shapes under 3-inch	Hoops, bands and cotton ties	Black plates for tinning	All other black plate and sheets	Tubing and pipe	Wire products	All other finished steel products	Total
1. Railroad structural material	.....	.....	.....	3.57	2.81	2.49	0.11	0.09	0.22	1.09	1.30	3.47	1.66
2. Other buildings and bridges	0.12	0.80	0.12	12.50	44.67	15.45	13.80	0.79	7.28	6.19	3.64	15.33	11.84
3. Railroad track work	78.19	17.76	87.66	0.28	0.01	1.42	.....	.....	.....	.....	0.04	4.15	11.01
4. Street railway construction	6.81	0.29	2.74	0.16	0.01	0.30	0.84	.....	0.39	.....	0.43	3.56	1.11
5. Automotive vehicles (motor cars, motor trucks, tractors, aeroplanes, etc.)	.....	0.03	.....	8.46	1.32	21.07	28.42	.....	28.28	0.90	4.56	3.39	8.98
6. Railway cars and locomotives	0.01	0.02	0.07	31.03	20.10	15.45	2.95	.....	6.79	1.53	1.17	22.14	11.18
7. Oil, gas and water requirements (pipe, rails, etc.)	0.01	0.01	0.01	23.61	6.56	3.67	4.99	1.30	9.72	63.36	4.42	4.06	14.84
8. Machinery and hand tools	0.01	0.62	0.01	2.36	1.22	12.25	3.46	.....	0.29	0.16	2.85	1.21	2.83
9. Agricultural equipment	0.03	0.04	0.01	0.88	0.81	2.58	2.37	.....	1.45	0.43	15.24	1.24	2.47
10. Food containers	.....	.....	.....	0.16	0.01	0.26	13.34	72.61	0.07	.....	1.00	0.02	4.16
11. Shipbuilding	.....	0.01	.....	3.45	2.20	1.28	0.03	.....	0.28	0.04	0.08	0.01	0.98
12. Exports	13.67	23.24	4.12	5.47	4.72	4.13	5.71	7.51	14.34	5.24	13.70	1.87	7.82
13. All other requirements	1.15	57.18	5.26	8.07	15.56	19.65	23.98	17.70	30.89	21.06	51.57	39.55	21.12
Totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Competition Spurs Steel Merger

Consolidations of Large Independent Companies Following Recent Lean Business Years Are the Result of Unequal Operating Conditions—Steel Corporation's Commanding Position Is Shown by Earning Statements—Causes Are Analyzed

BY A. O. BACKERT

NO YEAR since the historic period of amalgamations of numerous individual plants and combinations of plants which immediately preceded the formation of the United States Steel Corp. in 1901 saw so many plans brought forward for the merging of important iron and steel companies as the twelve months just past. Some of these proposals were carried out on a scale that promises to have a material bearing on the conduct of the iron and steel industry of the future; others for various causes failed of successful completion but left certain of these properties under such control and in such a receptive position that their ultimate inclusion in some form of combination remains a reasonable probability of the near future.

All the companies figuring in these various negotiations have belonged to the so-called independent group or those in no way related to or owned by the United States Steel Corp., representing in all, substantially 60 per cent of the steel ingot capacity of the United States.

Manifestly, some potent underlying forces have been driving these companies into closer alliance with each other. What these forces are and how they have come to the point of greatest effect at this time requires a careful analysis of the conditions that have surrounded the manufacture of steel in this country in recent years.

The war, in several ways, exerted an abnormal stimulus upon the industry. This was inevitable because of the character of steel as a prime essential of modern warfare and the prodigious quantities in which it is required. The allies far outclassed by Germany in available tonnage especially after the subjugation of Belgium and the occupation of industrial northeastern France turned to this country as the one haven of supply in all the world open to them. In one form or another they demanded practically every ton of steel that could be spared from commercial needs at home and abroad and begged for more, seemingly without regard to cost. This situation continued unrestrained for more than two years and was modified only in degree when the United States entered the war in April, 1917 and added its tremendous requirements to those already sought, finally making imperative the rationing of steel and the control of prices.

Annual Ingot Capacity Leading Companies

Gross Tons

Steel Corporation	22,500,000
Bethlehem Steel Corp.	7,500,000
Jones & Laughlin Steel Corp.	3,000,000
Youngstown Sheet & Tube Co.	2,200,000
Republic Iron & Steel Co.	1,400,000
Inland Steel Co.	1,200,000
Colorado Fuel & Iron Co.	1,140,000
Wheeling Steel Corp.	1,000,000
Steel & Tube Co. of America	860,000
American Rolling Mill Co.	675,000
United Alloy Steel Corp.	636,000
Pittsburgh Steel Co.	620,000
Lukens Steel Co.	612,000
Alan Wood Iron & Steel Co.	500,000
All others	10,000,000
Grand Total	55,000,000

Under this unparalleled impetus expansion of the steel capacity of the country went forward at a rapid rate. From 1914 to 1919 the steel ingot capacity of the United States was enlarged approximately 33 1/3 per cent or from about 39,200,000 tons to 51,500,000 tons annually. In 1919, 700,000 tons was added from new construction initiated during the final war year of 1918. These enlargements of the war period were carried out at a rate of speed and under conditions that made their cost exceptionally high and many of these went into capital accounts on that basis.

War Brings Important Changes

As the result of the war period and its extraordinary influences, certain important changes which have become almost fundamental in character have been brought about in the economics of steel manufacture in this country. These have tended to draw the line of competition more tightly than ever before and they have served to magnify under the prevailing conditions the advantages held by certain companies, particularly the Steel corporation.

Since the war or since 1918, the steel industry has had one good, one fair and two bad years in point of financial return. The good year was 1920, the fair one 1919 and the poor periods 1921 and 1922. All the steel companies of the country had a trying time in 1921. Considered in all aspects, this probably was the most disastrous year in operation of plants and in earnings in proportion to capacity that the steel industry ever had experienced. As an example, the Steel corporation in 1921 had net earnings before dividends of only $36,617,017 which compares with $30,267,529 in 1904 when its capacity was only about 60 per cent of that at the present time, and with $23,496,768 in 1914. Bonded interest in the latter period was $4,600,000 greater than in 1921. The Steel corporation, however, in 1921 fared much better than its competitors in the way of earnings after all charges before dividends with the exception of the Bethlehem Steel Corp.

A comparison of the earnings of leading steel companies after all charges before dividends had been deducted, for the years 1920, 1921 and partially for 1922 would show the following results:

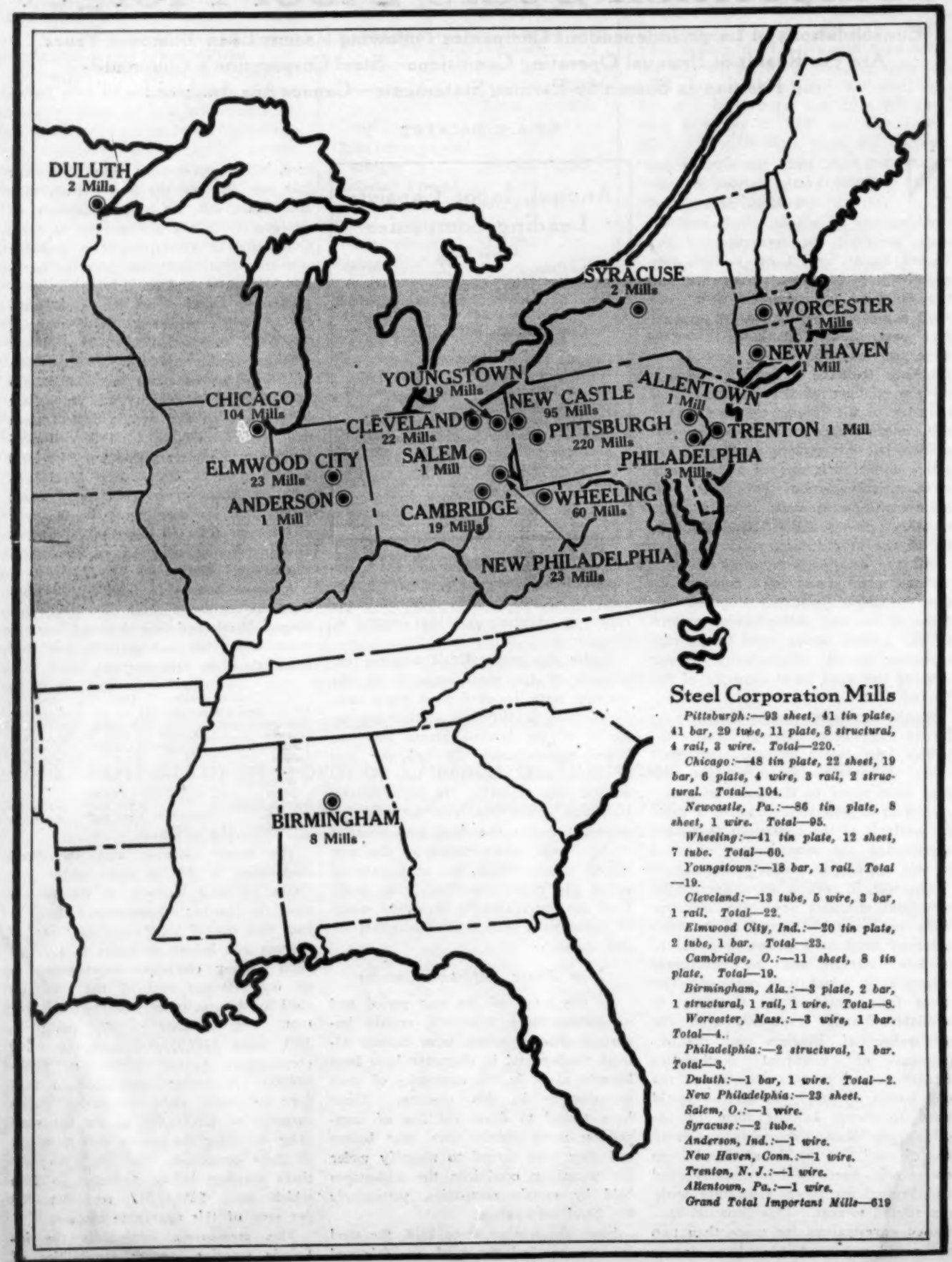
	1922 Nine months	1921	1920
U. S. Steel	$28,424,685	$36,617,017	$109,694,000
Bethlehem	.....	10,332,804	14,458,000
Midvale	3,348,802*	5,313,513*	12,424,919
Lackawanna	652,852*†	3,384,876*	4,294,375
Inland	.....	510,727	4,107,061
Brier Hill	.....	3,974,475*	3,269,188
Youngstown Sheet	.....	19,895*	.....
Steel & Tube	.....	2,571,352*	6,315,209
Republic	764,376*	5,665,242*	7,616,522

*Deficit. †6 months.

The better showing that the Steel corporation is able to make under conditions of poor business, at the present time, is further demonstrated by the fact that out of total earnings after all charges and before dividends in 1921 of eight leading companies representing in all over 60 per cent of the country's steel ingot capacity, it contributed 61 per cent. The earnings of this group in 1921 were $162,377,000 and the Steel corporation's portion of this was $109,694,000. A similar compilation in 1921 for the same eight companies shows earnings of $26,552,000 as the net total after deducting the various deficits of six of these companies. The Steel corporation's earnings before dividends in 1921 which were $36,617,017 represent 138 per cent of this aggregate amount.

This comparison emphasizes the infinitely superior earning possibilities of the Steel corporation in a period of lean

Steel Corporation's Important Mills Are Widely Distributed



Steel Corporation Mills

Pittsburgh:—93 *sheet*, 41 *tin plate*, 41 *bar*, 29 *tube*, 11 *plate*, 8 *structural*, 4 *rail*, 3 *wire*. *Total*—220.

Chicago:—48 *tin plate*, 22 *sheet*, 19 *bar*, 6 *plate*, 4 *wire*, 3 *rail*, 2 *structural*. *Total*—104.

Newcastle, Pa.:—86 *tin plate*, 8 *sheet*, 1 *wire*. *Total*—95.

Wheeling:—41 *tin plate*, 12 *sheet*, 7 *tube*. *Total*—60.

Youngstown:—18 *bar*, 1 *rail*. *Total*—19.

Cleveland:—13 *tube*, 5 *wire*, 3 *bar*, 1 *rail*. *Total*—22.

Elmwood City, Ind.:—20 *tin plate*, 2 *tube*, 1 *bar*. *Total*—23.

Cambridge, O.:—11 *sheet*, 8 *tin plate*. *Total*—19.

Birmingham, Ala.:—3 *plate*, 2 *bar*, 1 *structural*, 1 *rail*, 1 *wire*. *Total*—8.

Worcester, Mass.:—3 *wire*, 1 *bar*. *Total*—4.

Philadelphia:—2 *structural*, 1 *bar*. *Total*—3.

Duluth:—1 *bar*, 1 *wire*. *Total*—2.

New Philadelphia:—23 *sheet*.

Salem, O.:—1 *wire*.

Syracuse:—2 *tube*.

Anderson, Ind.:—1 *wire*.

New Haven, Conn.:—1 *wire*.

Trenton, N. J.:—1 *wire*.

Allentown, Pa.:—1 *wire*.

Grand Total Important Mills—619

Location of Steel corporation's principal finishing mills is shown. Shaded portion shows area in which great bulk of the country's steel is consumed

All Bethlehem Steel Corp. Mills Are Located in the East

Location of principal finishing mills of Bethlehem Steel Corp., the largest independent producer is shown. Shaded portion shows area in which great bulk of the country's steel is consumed

business as contrasted with that of the independent companies. Such an advantage stands forth clearly in the relative slump in earnings which the various companies experienced from the prosperous year of 1920 to the depression period of 1921. In a percentage way the difference is striking. Between 1920 and 1921 the net earnings of the Steel corporation after all charges and before dividends, fell off 66-2/3 per cent; those of the Midvale Steel & Ordnance Co., 143 per cent; of the Lackawanna Steel Co., 180 per cent; of the Inland Steel Co., 88 per cent; of the Brier Hill Steel Co., 221 per cent; of the Steel & Tube Co. of America 140 per cent; of the Republic Iron & Steel Co., 147 per cent. The decline of the Bethlehem Steel Corp. was only 29 per cent or less than that of the Steel corporation itself. This showing was an exceptional one, however, and was attributable to the large volume of business not of a comparative steel works character such as shipbuilding which had been carried over in an incompleted stage from 1920. The Bethlehem Steel Corp., as generally understood, embraces in its operations a variety of finished manufacture which the average steel plant does not pursue.

Another measure of the Steel corporation's earning capacity under the operating conditions that have prevailed in recent years in the steel industry is given by the rate per ton of ingots. In 1919 the Steel corporation plants earned before dividends $4.45 per ton of ingots compared with $2.84 per ton earned by the Republic Iron & Steel Co. and 43 cents per ton earned by the Lackawanna Steel Co. In 1920 the earnings of the three companies per ton of ingots were $5.70, $7.73 and $3.16 respectively; in 1920 they were a net of $3.34 per ton for the Steel corporation, a deficit of $1.08 per ton for the Republic Iron & Steel Co. and a deficit of $8.01 per ton for the Lackawanna Steel Co.

The capitalization of various steel companies at present on the basis of tonnage produced offers some interesting facts. In 1921, the Steel corporation had $24.60 in bonds and $28.60 in stocks outstanding or a total of $63.20 per ton of ingot capacity. The Bethlehem Steel Corp. before the absorption of the Lackawanna Steel Co. and the Midvale Steel & Ordnance Co. had $28.10 in bonds and $33.19, a total of $61.29; with the two latter companies included, the exhibit is $26.31 in bonds and $33.94 in stocks, a total of $60.25. The Republic Iron & Steel Co. had $9.53 in bonds and $39.53 in stocks, a total of $48.81. The Youngstown Sheet & Tube Co. in 1921 showed $45.60 in sotcks and nothing in bonds. The Brier Hill Steel Co. had $2 in bonds and $25 in stocks, a total of $27.60. This company recently voted to issue $10,000,000 of new bonds which would add approximately $14.30 of capitalization against each ton of ingot capacity. The Youngstown Sheet & Tube Co. by which it has been acquired has assumed this issue.

These figures are somewhat misleading in the case of the Steel corporation for the position of this producer is more favorable than that indicated by the comparison. This is by reason of the large undivided surplus which the leading interest now is carrying. At the end of 1921 this was $508,926,957, more than half of which was in cash, on deposit or in marketable securities. This surplus is almost exactly equal to the common stock outstanding. None of the independent companies which make public their full financial condition has a surplus so large or so liquid in proportion to its ingot capacity.

Competition Is The Key

The key to the superior competitive position of the Steel corporation today unquestionably lies in its complete integration particularly in coal and iron ore; in its numerous modernly equipped and widely diversified plants many of which are arranged for specialized production, and are well located both with respect to the chief market districts of the country and to sources of raw material; in its economies of operation permitted by the unification of its properties, the large scale of production and the skill of its directing personnel; and in its control of transportation agencies.

Of the Steel corporation's 619 mills engaged in producing the most important lines such as plates, structural shapes, bars, sheets, tubes, wire, tin plate and rails, 598 are located in the great central western zone in which, by far the larger portion of the consumption or fabrication of steel in this country is concentrated today. This section stretches from the Pittsburgh district on the east to St. Louis on the west and from the shores of Lake Huron through Southern Wisconsin on the north to the Ohio river on the south.

The drastic advances in freight rates in the past five years, amounting to from 80 to over 100 per cent—and applying both to raw materials and to finished product for the market, have added to the relative strength of the Steel corporation. The effect of these advances has been to circumscribe the limits of and to localize competition, more or less. The numerous plants of the leading producer located closely to chief points of consumption, have enabled it to reap considerable advantage from this situation. Furthermore, the ore roads of the Steel corporation in Minnesota have proved a source of greater revenue by reason of the rate advances whereas just the opposite effect has been created for the independent companies which, not only do not possess their own means of transportation but are obliged to pay an increased charge for the carriage of their chief material of manufacture.

Just what these various elements of advantage represent in the aggregate per ton of steel produced, cannot be readily determined. Judge Gary testified before the Lockwood commission at New York last summer under examination stated the Steel corporation had a cost per ton of steel $3 lower than its competitors, as an outside figure. This is probably a very conservative statement, especially in the light of that shown by a comparison of the earning statements of the various steel companies for 1921.

Various reasons for the joining of forces of various independent steel companies at this time have been set forth by those who have been active or have been instrumental in bringing to a head, the different negotiations for amalgamations. These relate to the value of consolidating raw material; to economies of operations, both in production and distribution; to a unification of management and control over numerous plants; and other benefits and potentialities that go with operations on an enlarged scale. These are the things in which the Steel corporation by virtue of its form and scope, enjoys, especially under present-day conditions, a distinct advantage over individual management or control.

The conclusion is logical, therefore, that, in the final analysis, it is the equalization of competition that is the driving incentive for the various mergers which have been or now are being carried out. Hence, the expressed fear of the federal trade commission that these combinations will tend to restrain competition, misses the main point. Actually, they should strengthen and intensify competition though perhaps altering its present form. While control of numerous plants will be concentrated in fewer hands, the dominating position in the industry which the Steel corporation always has occupied, promises to be modified by the rise of larger corporations paralleling in a considerable way its own organization.

The first important merger of the year to be announced was the acquisition of the properties of the Lackawanna Steel Co. by the Bethlehem Steel Corp. which took place under date of May 16.

(*Concluded on Page* 14)

Construction Gains Momentum

Financial Conditions, Which Maintained Last Year, Exerted Restraining Influence on Blast Furnace, Open-Hearth and Rolling Mill Extension—Outlook for Steelworks Expansion During 1923 Appears More Encouraging

BY J. D. KNOX

ENLARGEMENT of capacity in the steelmaking and rolling mill fields during 1922 was influenced largely by the lack of ready capital, decrease in earnings, and by the cost of construction and materials. More consideration was given to plant consolidation throughout the first nine months of the year just closed than to programs of expansion. As a result of these barriers, therefore, extension of by-product, blast furnace, open-hearth and rolling mill capacity during the 12-month period just ended declined to the lowest point recorded in the past five years. Prospects for 1923, however, appear more promising in view of 270 per cent more coke ovens, 100 per cent more open-hearth furnaces and about 109 per cent more rolling mills being scheduled for completion than were built during 1922.

Open-hearth furnaces in the course of erection at the beginning of 1923 totaled 14 and promised the addition of 1,030,000 tons annally to the national ingot capacity. One year previous the number of steel melting units under construction was four, having a total rated capacity of 280,000 tons. At the beginning of 1921, 12 open hearths designed to yield 665,000 tons annually were included in the steelworks' expansion while at the opening of 1920 construction had been started on 25 units which promised 1,392,000 tons additional to the country's steelmaking capacity. Open hearths scheduled for construction at the opening of 1919 totaled 12 with an annual yield of 1,005,000 tons, while those slated for 1918 completion totaled 27 with an aggregate output of 1,530,000 tons. Units in the course of construction on Jan. 1, 1917, numbered 95 and offered an additional 4,795,500 tons to the country's ingot capacity. The number of regenerative furnaces built during the past decade and to what extent the gross tonnages have accentuated the estimated ingot capacity of the steel industry in America may be compared in the following table:

Year	Number of furnaces	Gross tons	National ingot capacity
1922.....	7	364,000	54,484,000
1921.....	13	620,000	54,120,000
1920.....	26	1,268,000	53,500,000
1919.....	23	1,871,000	52,200,000
1918.....	39	2,192,500	50,500,000
1917.....	102	5,413,000	48,500,000
1916.....	105	4,300,000	43,000,000
1915.....	43	1,759,000	39,000,000
1914.....	9	507,000	37,500,000
1913.....	62	3,120,000	37,000,000

Details by companies of the number of new open hearths laid down during 1922 together with their estimated annual output are shown in Table II. The completion of the seven units listed netted the ingot capacity of this country 364,000 tons additional. The program of open-hearth construction for 1922 together with the annual tonnage output involved, therefore, was the smallest completed over the last 10 years as shown by the foregoing table of statistics. The smallest expansion program during this period was in 1914 when 507,000 gross tons of ingots were added to the national capacity representing nine furnaces.

Table I

Recapitulation

	1922 Completed	1922 Building
By-product ovens	133	493
Blast furnaces	..	1
Open hearths	7	14
Rolling mills:		
Bar	1	1
Blooming	1	3
Merchant	1	1
Rerolling	..	1
Rod	1	1
Sheet, cold	5	23
Sheet, hot	18	30
Sheet bar	1	2
Strip, cold	14	20
Strip, hot	4	1
Tube, buttweld	..	7
Tube, lapweld	..	4
Tube, seamless	..	2
Total rolling mills	46	96
Electric furnaces:		
Greaves-Etchells	1	2
Heroult	5	1
Moore	1	3
Unclassified	9	..
Total electric furnaces	16	6

1917 Stands as Best Year

From the standpoint of tonnage, 1917 was the banner year, the good showing being directly traceable to the heavy demand for war materials. Since then, however, the annual increase of ingot capacity has been decreasing and for the past two years the decline in this direction has been at a brisk rate. Last year's program included the completion of seven open hearths having an annual output of 364,000 tons which was 41 per cent less than the gross tonnage added in 1921 and 71 per cent under that recorded for 1920.

Added open-hearth production in 1922 of 364,000 tons brings the estimated total steel capacity of this country to 54,400,000 tons. Prospects for a better showing this year appear more promising in view of 14 steelmaking furnaces being under construction assuring 1,030,000 gross tons additional ingot capacity. This compares with an expansion program on Jan. 1, 1922, of four units of 280,000 tons output. Construction work scheduled at the beginning of 1921 included eight open hearths of 465,000 tons capacity. On Jan. 1, 1920, there were 25 furnaces in the process of building with a combined output of 1,392,000 tons. Construction at the beginning of 1919 involved 12 units designed for the production of 1,005,000 tons. This compares with 27 open hearths of 1,530,000 tons capacity under construction on Jan. 1, 1918 and 95 units with a combined output of 4,800,000 tons being built at the opening of 1917.

On Jan. 1, 1914, the ingot-producing capacity of the United States was estimated by IRON TRADE REVIEW at 37,000,000 tons. During the succeeding nine-year period ingot capacity increased 17,484,000 tons, or 47 per cent. New furnaces placed in action from 1913 to 1917 augmented the original estimate of steel-ingot output in this country to 43,000,000 tons. Additions during the following year of more than 5,000,000 tons led to an estimate of 48,500,000 tons. During 1918, additions averaged over 2,000,000 tons bringing the country's ingot production in excess of 50,000,000 tons. With the increased open-hearth capacity built during the past five years, the estimated ingot producing capacity of the country on Dec. 31, 1922 was 54,484,000 tons.

By-product coke ovens completed in 1922 as shown in Table VII totaled 133 and added 597,000 tons to the coking capacity of the United States. In the 1921 program 283 ovens of this type were built affording 1,315,000 tons additional while in 1920 the coking capacity added was 5,840,150 tons representing 1213 new ovens or the re-

generative type. During 1919 new by-product coke ovens installed amounted to 783 and afforded 3,483,505 tons. New coking capacity brought in last year, therefore, was 55 per cent less than in 1921, 90 per cent less than in 1920, and 83 per cent less than in 1919.

Recent statistics compiled by the government show that production of by-product coke during November, 1922, amounted to nearly 3,000,000 tons, bringing last year's total to Dec. 1 to 25,374,000 tons. Indications are that the last 12-month output will exceed 28,000,000 tons, establishing the second highest rate in the history of the industry. The largest production amounting to 30,834,000 tons was recorded in 1920.

Beehive Output Suffers

Beehive coke produced in this country during 1921 declined to 5,538,000 tons, which is 73 per cent less than the 1920 output and the lowest rate recorded in 36 years. The number of beehive ovens suitable for coking at the end of 1921 aggregated 66,014; the previous year there were 75,298 ovens of this type in existence. The loss of 9284 beehive ovens during this period is the largest ever reported in any one year. The combined output of by-product and beehive coke during 1921 amounted to 25,287,622 tons, of which 22 per cent was contributed by beehive ovens. This compares with 40 per cent during 1920.

By-product coke ovens in the United States May 1, 1921, totaled 11,396 according to a list compiled in the *A B C of Iron and Steel*. With the completion of 283 by-product ovens during 1921, the total was increased to 11,679. With the addition of 133 new units during 1922 the actual number of by-product ovens in America at the beginning of 1923 stood at 11,812, their annual coking capacity approximating 45,810,380 tons. As the close of 1922 there were 493 by-product coke ovens under construction, distributed 366 at the Clairton plant of the Carnegie Steel Co. and 37 at the Weirton plant of the Weirton Steel Co., all of the new Koppers design. The new ovens at Clairton, Pa., will be of the combination type so arranged that they may be heated with producer or blast furnace gas, thus making available all coke oven gas for use in the mills. This addition will increase the carbonizing capacity of the Clairton installation by 8500 tons of coal per 24 hours and when completed will bring the carbonizing capacity of this plant to a total of 21,500 tons of coal per day. The original installation built in 1917 consisted of 640 ovens which was increased one year later to 768 units. This last addition of 366 ovens, therefore, brings the total to 1134, making the installation the largest of its kind in the world.

No Stacks Built During 1922

Construction of blast furnaces in 1922 was neglected due undoubtedly to the large overhead which would have been entailed. A new 50-ton stack built in 1913 cost $1,264,000 while one completed during 1921 cost the owners nearly $5,000,000, or about 75 per cent higher. In view of this condition, therefore, it is questionable whether much blast furnace expansion can be expected within the immediate future. Only on one other occasion and that in 1914 has a year closed since 1904 without pig iron producing capacity having been augmented. Pig iron capacities in gross tons of all new

Equipment Completed or Building in 1922

Table II

Open Hearths Completed During 1922

Company	Number of furnaces	Rated capacity tons	Annual capacity tons
*Carnegie Steel Co., Youngstown, O.	6	..	.....
Chemung Iron & Steel Co., Elmira, N. Y.	1	60	40,000
Lorain Steel Co., Johnstown, Pa.	1	25	22,000
Mansfield Sheet & Tin Plate Co., Mansfield, O.	4	100	280,000
Universal Steel Co., Bridgeville, Pa.	1	25	22,000
Total	7		364,000

*Rebuilt.

Table III

Open Hearths Building Dec. 31, 1922

Company	Number of furnaces	Rated capacity tons	Annual capacity tons
Bethlehem Steel Co., Sparrows Point, Md.	4	100	280,000
Bethlehem Steel Co., Sparrows Point, Md.	1	200	120,000
*Carnegie Steel Co., Duquesne, Pa.	2	75	.....
Otis Steel Co., Cleveland	4	100	280,000
Wisconsin Steel Co., Chicago	5	100	350,000
Total	14		1,030,000

*Rebuilding.

Table IV

Blast Furnaces Completed During 1922

Company	Number of furnaces	Daily capacity tons	Annual capacity tons
Witherbee-Sherman & Co., Port Henry, N. Y.	1	450	155,250

Table V

Stacks Remodeled During 1922

Company	Number or name
Adrian Furnace Co., DuBoise, Pa.	Adrian
American Steel & Wire Co., Pittsburgh	1
Carnegie Steel Co., Duquesne, Pa.	3
Carnegie Steel Co., Rankin, Pa.	5
Cranberry Furnace Co., Johnson City, Tenn.	Cranberry
Deleware River Steel Co., Chester, Pa.	Chester
National Tube Co., Lorain, O.	4
National Tube Co., McKeesport, Pa.	2
Northern Iron Co., Standish, N. Y.	Chateaugay
Shenango Furnace Co., Sharpsville, Pa.	3
Tennessee Coal, Iron & Railroad Co., Ensley, Ala.	1
Wheeling Steel Corp., Martins Ferry, O.	Martins Ferry
Wheeling Steel Corp., Steubenville, O.	2
Total	13

Table VI

Stacks Being Remodeled Dec. 31, 1922

Company	Number or name
Cumberland Coal & Iron Co., Dayton, Tenn.	1 and 2
Sharpsville Furnace Co., Sharpsville, Pa.	Sharpsville
Total	3

Table VII

By-Product Ovens Completed in 1922

Company	Number of ovens	Type of ovens	Est. annual coking cap., tons
Alabama By-Product Coke Corp., Birmingham, Ala.	25	K	117,500
Cambria Steel Co., Johnstown, Pa.	1	C-B	3,000
Cambria Steel Co., Johnstown, Pa.	2	S-S	10,400
Chicago By-Product Coke Co., Chicago	5	K*	31,400
Milwaukee Coke & Gas Co., Milwaukee	100	K	435,000
Total	133		597,300

Type of ovens: K, Koppers; C-B, Cambria-Belgium; S-S, Semet-Solvay; K*, Koppers new design.

Table VIII

Ovens Building Dec. 31, 1922

Company	Number of ovens	Type of ovens	Est. annual coking cap., tons
Carnegie Steel Co., Clairton, Pa.	366	K*	2,299,500
Weirton Steel Co., Weirton, W. Va.	37	K*	232,500
Total	493		2,532,000

K*, Koppers new design.

Rolling Mills Completed or Building in 1922

Table IX

Rolling Mills Completed During 1922

Company	No. mills	Type mill
Ashtabula Steel Co., Ashtabula, O.	8	28″ hot sheet
Ashtabula Steel Co., Ashtabula, O.	2	26″ cold sheet
Hudson City Steel Corp., Hudson, N. Y.	5	10″ cold strip
Hudson City Steel Corp., Hudson, N. Y.	5	12″ cold strip
Illinois Steel Co., Gary, Ind.	1	12″ hot strip
Illinois Steel Co., Gary, Ind.	1	20″ hot strip
Kansas City Nut & Bolt Co., Kansas City, Mo.	1	10″ merchant
Kansas City Nut & Bolt Co., Kansas City, Mo.	1	8″ bar
Mansfield Sheet & Tin Plate Co., Mansfield, O.	1	32″ blooming
Mansfield Sheet & Tin Plate Co., Mansfield, O.	1	24″ sheet bar
Milwaukee Rolling Mill Co., Milwaukee	2	28″ hot sheet
Minnesota Steel Co., Duluth, Minn.	1	10″ rod
Otis Steel Co., Cleveland	8	30″ hot sheet
Otis Steel Co., Cleveland	3	28″ cold sheet
Trumbull Steel Co., Warren, O.	1	14″ hot strip
Wallingford Cold Rolled Steel Co., Wallingford, Conn.	2	14″ cold strip
West Leechburg Steel Co., West Leechburg, Pa.	1	20″ hot strip
Worcester Pressed Steel Co., Worcester, Mass.	2	
Total	46	

Table X

Rolling Mills Building Dec. 31, 1922

Company	No. mills	Type mill
Atlas Steel Corp., Dunkirk, N. Y.	1	20″ blooming
Chapman-Price Steel Co., Indianapolis, Ind.	1	28″ hot sheet
LaBelle Iron Works, Steubenville, O.	1	35″ blooming
LaBelle Iron Works, Steubenville, O.	1	19″ sheet bar
Michigan Steel Corp., Detroit	6	30″ hot sheet
Michigan Steel Corp., Detroit	6	28″ cold sheet
National Enameling & Stamping Co., Granite City, Ill.	1	72″ jobbing sheet
National Enameling & Stamping Co., Granite City, Ill.	4	24″ cold sheet
National Enameling & Stamping Co., Granite City, Ill.	6	28″ hot sheet
National Steel Rolling Co., New York	1	18″ rerolling
National Tube Co., Gary, Ind.	5	buttweld tube
National Tube Co., Gary, Ind.	4	lapweld tube
National Tube Co., Gary, Ind.	1	seamless
Newton Steel Co., Newton Falls, O.	8	28″ hot sheet
Newton Steel Co., Newton Falls, O.	8	26″ cold sheet
Otis Steel Co., Cleveland	1	40″ blooming
Otis Steel Co., Cleveland	1	24″ sheet bar
Otis Steel Co., Cleveland	1	20″ hot strip
Otis Steel Co., Cleveland	5	20″ cold strip
Otis Steel Co., Cleveland	5	16″ cold strip
Otis Steel Co., Cleveland	5	12″ cold strip
Otis Steel Co., Cleveland	5	10″ cold strip
Southern Steel & Rolling Mill, Inc., Birmingham, Ala.	1	16″ bar
Steel & Tube Co. of America, Indiana Harbor, Ind.	2	buttweld tube
Fairfield Steel Co., Fairfield, Ala.	1	11″ merchant
Weirton Steel Co., Weirton, W. Va.	8	30″ hot sheet
Weirton Steel Co., Weirton, W. Va.	5	28″ cold sheet
Weldless Tube Co., Wooster, O.	1	seamless tube
Whitaker-Glessner Co., Wheeling, W. Va.	1	10″ rod
Total	96	

stacks placed in blast each year from 1905 to 1922 inclusive, may be compared in the following table:

1922	None
1921	207,000
1920	1,138,500
1919	396,750
1918	1,425,000
1917	2,182,500
1916	530,000
1915	530,000
1914	None
1913	550,000
1912	1,000,000
1911	565,000
1910	1,794,000
1909	1,930,000
1908	1,188,000
1907	2,065,000
1906	1,135,000
1905	1,292,000

At the close of 1922 the Witherbee, Sherman & Co. had a 450-ton blast furnace under construction at Port Henry, N. Y. The officials of the company expect to apply the blast to this stack about May 1. Stacks remodeled last year totaled 12 and included the Adrian furnace of the Adrian Furnace Co., DuBois, Pa.; the No. 3 furnace of the Carnegie Steel Co., Duquesne, Pa.; No. 5 furnace of the Carnegie Steel Co., Rankin, Pa.; the Cranberry stack of the Cranberry Furnace Co., Johnson City, Tenn.; the Chester furnace of the Delaware River Steel Co., Chester, Pa.; No. 4 furnace of the National Tube Co., Lorain, O.; No. 2 furnace of the same company at McKeesport, Pa.; the Chateaugay furnace of the Northern Iron Co., Standish, N. Y.; No. 3 furnace of the Shenango Furnace Co., Sharpsville, Pa.; No. 1 furnace of the Tennessee Coal, Iron & Railroad Co., Ensley, Ala.; the Martins Ferry O., stack of the Wheeling Steel Corp.; and No. 2 furnace of the latter corporation at Steubenville, O.

Alteration of the No. 3 stack of the Shenango Furnace Co. increased its rating from 350 to 550 tons per day. The old shell of the Delaware River Steel Co. stack was replaced by a 13 x 18 x 85-foot stack and in addition two Mullen-type dry dust cleaners, new hot blast and chimney valves, new stove and boiler gas burners, new stock trestle and boiler stack were installed. Reconstruction work on the Sharpsville furnace of the Sharpsville Furnace Co., Sharpsville, Pa., which includes three new stoves and Brassert-type gas cleaning system, is to be completed May 1, 1923.

Table XI

New Electric Furnaces Operated in 1922

HEROULT	units	tons
Electric Foundry & Engineering Co., Tacony, Pa.	1	1
International Nickel Co., Huntington, W. Va.	1	7
Lorain Steel Co., Johnstown, Pa.	1	4
Oil Well Supply Co., Oil City, Pa.	1	2
United Alloy Steel Corp., Canton, O.	1	3
*Washington Iron Works, Seattle, Wash.	1	3
GREAVES-ETCHELLS		
Ford Motor Co., Detroit	1	60
*Ford Motor Co., Detroit	2	10
MOORE		
*Blackwood Electric Steel Corp., Parkersburg, W. Va.	1	3
Bonney Floyd Steel Foundry Co., Columbus, O.	1	3
*Dayton Steel Foundry Co., Dayton, O.	1	3
*Pittsburgh Valve, Foundry & Construction Co., Pittsburgh.	1	3
UNCLASSIFIED		
Bethlehem Steel Co., Steelton, Pa.	1	6
Unidentified companies	8	
Total completed Dec. 31, 1922	16	
*Total building Dec. 31, 1922	6	

*Building, Dec. 31, 1922.

Miscellaneous additions to various plants during 1922 included a sintering plant of the Greenwalt type at the Pulaski Iron Co., Pulaski, Va., and at the Edgar Thomson works of the Carnegie Steel Co., North Braddock, Pa.; four 300-horsepower Sterling-type boilers and one 500-kilowatt turbine at the Northwest Barb Wire Co., Sterling, Ill.; three 4-door heating furnaces and 13 side-fired heating furnaces all oil-fired to replace former coal-fired units at the plant of the Heppenstall Forge & Knife Co., Pittsburgh; a new gas producer at the Central Tube Co., Pittsburgh; one 10 x 16-foot coal-fired heating furnace equipped with a 400-horsepower waste heat boiler at the Midvale Steel & Ordnance Co., Philadelphia; an 80 x 280-foot roll and machine shop building at the Alan Wood Iron & Steel Co., Philadelphia; one 2000-horsepower generator and a 1500-kilowatt motor-generator set at the Atlantic Steel Co., Atlanta, Ga.; and two coke oven gas, Chapman-Stein type recuperative continuous heating furnaces which replace six reversing regenerative furnaces and the electrification of the sheet mill drive at the Youngstown Sheet & Tube Co., Youngstown, O.

Construction of a miscellaneous character now under way includes a 90 x

280-foot galvanizing department, a 90 x 171-foot wareroom and two double galvanizing frames of 30 wires each at the Kokomo Steel & Wire Co., Kokomo, Ind.; two coke oven gas, Springfield-type boilers rated at 3010-horsepower with superheaters and coal-handling equipment at the Youngstown Sheet & Tube Co., Youngstown, O; two 7 x 16-foot heating furnaces at the Maryland Steel Rolling Co., Baltimore; one 10 x 16-foot heating furnace equipped with a 400-horsepower waste heat boiler and eight 3760-horsepower waste heat boilers at the open-hearth department of the Midvale Steel & Ordnance Co., Philadelphia; and a pig casting machine at the Belfont Iron Works, Ironton, O.

Expansion in the electric steel industry during 1922 probably did not exceed 16 new units designed for steel casting or ingot production. While Table XI shows the completion of eight furnaces, a similar number of units was completed by unidentified companies bringing the total to 16. The year previous 13 electric furnaces were built which compares with 34 units in 1920, 53 in 1919, 54 in 1918, 97 in 1917, 63 in 1916, and 32 in 1915.

Rolling mills completed in this country during 1922, as shown in Tables I to IX, totaled 46 units of various types. During 1921 various rolling mills laid down reached 185 compared with 241 in 1920 and 50 in 1919. Of the various type units completed in 1919 about 44 per cent were adapted to the rolling of steel sheets while 34 per cent of those laid down during the following year were scheduled on sheet production. Reports for 1921 indicated that 32 per cent of the mills placed under power were hot sheet mills. Last year, however, hot sheet mill expansion was confined to 18 units or 39 per cent of the combined number of new installations.

Sheet mills under construction at the close of 1922 totaled 30, including a 6-unit plant for fine finish output in Detroit, the first to be located in the center of the automotive producing field. The success of this installation is being watched with interest by those engaged in the industry in view of its isolation from the labor supply. Also of interest is the fact that the Weirton Steel Co. whose present output largely is confined to strip steel and tin plate, will engage in the manufacture of sheets upon the completion of eight new mills this year. The standing of the various sheetmakers in the Mahoning valley again will be altered upon the completion of the eight new hot mills during 1923 of the Newton Steel Co., which also will increase the number of hot sheet mills in that district from 111 to 119. The standing of the Newton company will advance from fifth to the sharing of second place.

Increased uses of strip steel is reflected by the steady rate of advance in the construction of new hot and cold mills. During 1921 two hot and 41 cold strip mills were completed while last year claimed four hot and 14 cold units. One hot and 20 cold strip mills are scheduled for completion this year, all of the latter being erected by the Otis Steel Co., Cleveland, which is the latest entrant to the strip industry.

During 1922 the International Nickel Co. completed a new plant at Huntington, W. Va., for rolling monel metal including one 4-stand 9-inch merchant; a 5-stand 9-inch merchant; a 5-stand 10-inch merchant; a 3-stand 14-inch merchant; a 5-stand 14-inch merchant; a 5-stand 20-inch merchant; and a 2-stand 24-inch bar mill.

Builds Purifying Plant

A 12,000,000-cubic foot liquid purifying plant for the purification of coke oven gas for open-hearth combustion now is being erected at the Midland, Pa., plant of the Pittsburgh Crucible Steel Co. This plant, it is claimed, will be the first of its kind to be built in connection with steel plant operation in this country. Improvements to the 132-inch plate mill, which will alter the rolling range of sizes, were begun by the Brier-Hill Steel Co. late in 1922. Officials of this company also plan to engage in the pipe and strip steel industry.

Refinancing was undertaken by the American Rolling Mill Co. for the enlargement of the company's Ashland, Ky., plant for the production of about 250,000 tons of sheets and light plates. While the actual number of sheet mills entailed in the expansion program is not known definitely, it is understood about 40 will be installed. In this event, the American Rolling Mill Co. will become the largest independent sheet producer in the United States. Plans now are being prepared for a 6-mill sheet plant for the Columbia Steel Co., Pittsburg, Cal. When completed, this installation will be the first sheet mill on the Pacific coast and the only unit west of St. Louis.

Preliminary plans were being prepared at the end of 1922 by the McKinney Steel Co., Cleveland, for the erection of finishing mills to care for a large part of its present production of semifinished material. While definite information is lacking, it is understood attention is beng gven to structural shape and bar capacity. Projection at the beginning of 1923 also included 40 sheet mills by the Ford Motor Co., together with 12 electric furnaces and two small blooming mills.

Competition Spurs Mergers in Steel Industry

(*Concluded from Page* 10)

As a result of this amalgamation the steel ingot capacity of the Bethlehem Steel Corp. was increased to approximately 5,000,000 tons by the addition of the 1,840,000 tons of the Lackawanna Steel Co. On June 1, announcement was made of plans for the merging of the Midvale Steel & Ordnance Co., the Republic Iron & Steel Co. and the Inland Steel Co. These companies were to be unified under the ownership of the Midvale Steel & Ordnance Co., the name of which was expected to be changed to the North American Steel Co. This combination represented an annual steel ingot capacity of approximately 500,000 tons. The carrying on of the negotiations for the Midvale-Republic-Inland merger had been attended by much publicity. Shortly after the plan for amalgamation was announced officially, the federal trade commission issued a complaint against the proposal on the ground that it would constitute an unfair method of competition and restrain trade and commerce. A similar complaint was made against the Bethlehem-Lackawanna union. Before the complaint came to a hearing, those guiding the Midvale-Republic-Inland merger in September voluntarily voted to abandon their plan and agreement to this effect was entered on the record. The reason for this action was the unwillingness of the bankers to guarantee the new securities because of the action of the trade commission. Up to the end of the year the Bethlehem-Lackawanna complaint had not yet come to a hearing before the federal trade commission.

In Nov. 24 the Bethlehem Steel Corp. unexpectedly announced the acquisition of the Midvale Steel & Ordnance Co. which had controlled the Cambria Steel Co. and various other works located principally in the East. This acquisition increased the annual ingot capacity of the Bethlehem Steel Corp. to 7,500,000 tons where it remains at the present time. On Dec. 19, the Youngstown Sheet & Tube Co. took over the Brier Hill Steel Co., making itself the third largest independent interest in the country with an annual ingot capacity of 2,200,000 tons. Negotiations then were being carried forward for amalgamation with other properties notably the Steel & Tube Co. of America and possibly the Inland Steel Co.

Four outstanding mergers therefore were developed during the year. Three were carried out and one other was abandoned because of governmental objections, after it had been advanced to the final stage.

IRON TRADE REVIEW

Registration Applied for

The Authority of Industry — National and International

January 4, 1923

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Annual Statistical Number—The Year Book of Industry

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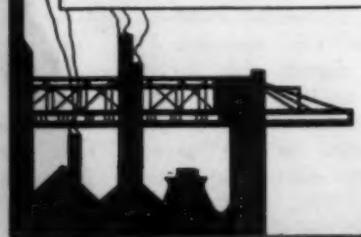


Business Outlook Is Favorable

Many Constructive Factors Denote Great Underlying Strength of Economic Situation as New Year Begins—Activity of Iron and Steel Industry Significant—Adverse Elements Bear Watching—Labor Shortage Looms

BY JOHN W. HILL

BUSINESS has entered the new year under great momentum and with every promise of continued activity for months to come. The strength of underlying conditions is revealed by many factors. In such basic and barometric industries as building and iron and steel the usual winter relaxation is almost absent. Prices are rising. Crops are large. Money is cheap and business profits are increasing. These facts and numerous others indicate that practically all the conditions essential for a period of trade expansion are at hand.

Steady improvement during 1922 has brought striking changes in the economic picture. At the beginning of the year unemployment was widespread, industry was restricted, and the purchasing power of wage-earners and of farmers was at low ebb. In addition, doubt prevailed as to the veracity of signs which seemed to point toward a dawning revival of trade and industry.

Events have more than fulfilled expectations. Involuntary unemployment has passed. Industrial output is at 1920 levels. Demand is broadening and the nation's purchasing power has been vastly strengthened by wage advances and the great upsweep of prices for farm products. Moreover liquidation of loans and of inventories has been completed and banking reserves are stupendous.

The year just closed began with depleted stocks of both raw and finished material. This was due to the severe curtailment of industry in 1921, which carried production below the level of normal consumption. During 1922, it was necessary to meet demand from current output. This resulted in steadily increasing activities and rising prices. With the upturn of general commodity values, as pictured by the chart in the Business Trend, has come greater confidence in the future and the gradual abandonment of hand-to-mouth buying in favor of more liberal commitments.

Good Foundation Is Established

The forward movement of industry during the last year has been marked by unprecedented activities in building construction, a new record for automobile production, a sweeping recovery in iron and steel operations and the development of railroad purchasing upon a large scale. Continued activities in these lines, all of which are foundations for prosperity constitute a convincing forecast for good times this year.

The probable duration of the present period of expansion is the uppermost question in the minds of executives now planning their course for 1923. Present indications are unmistakable for clear weather during the first six months. The improvement probably will continue throughout the year. Certain adverse elements are in the horizon, however, and they should be closely watched for any signs of developing sufficient influence over the business situation, to cause reaction.

Among these potentially unfavorable factors are the agitation for uneconomic legislation, the looming labor shortage, European unsettlements, inadequate railroad facilities, the possibility of a coal strike and the prospects for large exports of gold. Some of these elements individually possess greater possibilities for harm than others.

The political discontent in the country as expressed in the November elections may have an unfavorable effect upon business prosperity. The weakness of the security markets last fall partly was due to the blow at confidence caused by the success of radical leaders at the polls. These leaders have espoused many ill-considered measures designed to aid the farmer, benefit union labor, impose new inflictions upon the sorely-pressed railroads, and strike at capital through higher taxes and other means.

The recent unparalleled wave of stock dividends reflected a belief that congress would attempt some excessive taxation upon corporate surpluses. There is encouragement in the probability that the majority of the proposals never will see light of day. In the meantime, rising prices for farm products, and increasing activities in industrial centers are tending to allay the spirit of discontent.

One of the most outstanding constructive factors in the outlook for 1923 is the present indication of an impending settlement of Europe's perplexing reparations problem. The active interest of the American government in the problem which has just been announced, coincides with the rapid growth of sentiment in the country favor of rendering aid toward establishing economic equilibrium abroad. This is due to increasing appreciation of the important bearing European purchases of American farm products have upon prosperity in the agricultural sections and in the whole country as well. In the meantime, business conditions are improving abroad. Actual and anticipated improvement is reflected in the recent advances of exchange rates, as shown by the Business Trend chart.

Credit Facilities Abundant

One of the prime essentials for any sustained period of trade activity is ample credit facilities. The country now possesses these in abundance. The present excellent position of the financial system is due to extensive loan liquidation and to enormous gold imports. Since 1920 the gold reserves of the federal reserve system have increased by $1,000,000,000 to over $3,000,000,000. The total monetary gold stocks of the country of nearly $4,000,000,000 represent fully one-half of the world's supply.

Conditions are ripening for a return of some of this gold to Europe. The federal reserve system has sufficient free gold to support an additional credit expansion of about $15,000,000,000. It has about $700,000,000 of surplus gold reserves. This will permit of heavy exports of gold before credit conditions in this country would be affected.

The most striking measure of trade improvement is to be found in the strength of commodity prices. The deflation of wholesale values through 1920 and 1921 was the most drastic ever recorded in a similar period of time. Prices stopped falling in the summer of 1921. What followed, at first slowly and then with gathering momentum, was the greatest peacetime rise of prices in history.

The extent of this movement ranges from 13 per cent for the weighted index of wholesale prices compiled by the bureau of labor statistics at Washington, to 29 per cent for the index computed by *Bradstreet's Journal*. The Bradstreet number contains numerous raw materials. Its rise since 1921 exceeds that for 10 years from 1903 to 1913.

The movement of prices from the armistice to the present time has clearly demonstrated three important facts. They are:

1. That there is no immediate pos-

The Business Trend

of 1922 for 1923

Iron Trade Review Charts Show Basic Strength

CONSTRUCTIVE factors predominate in the business outlook for 1923. The upward trend, depicted by the accompanying charts should continue for some months to come.

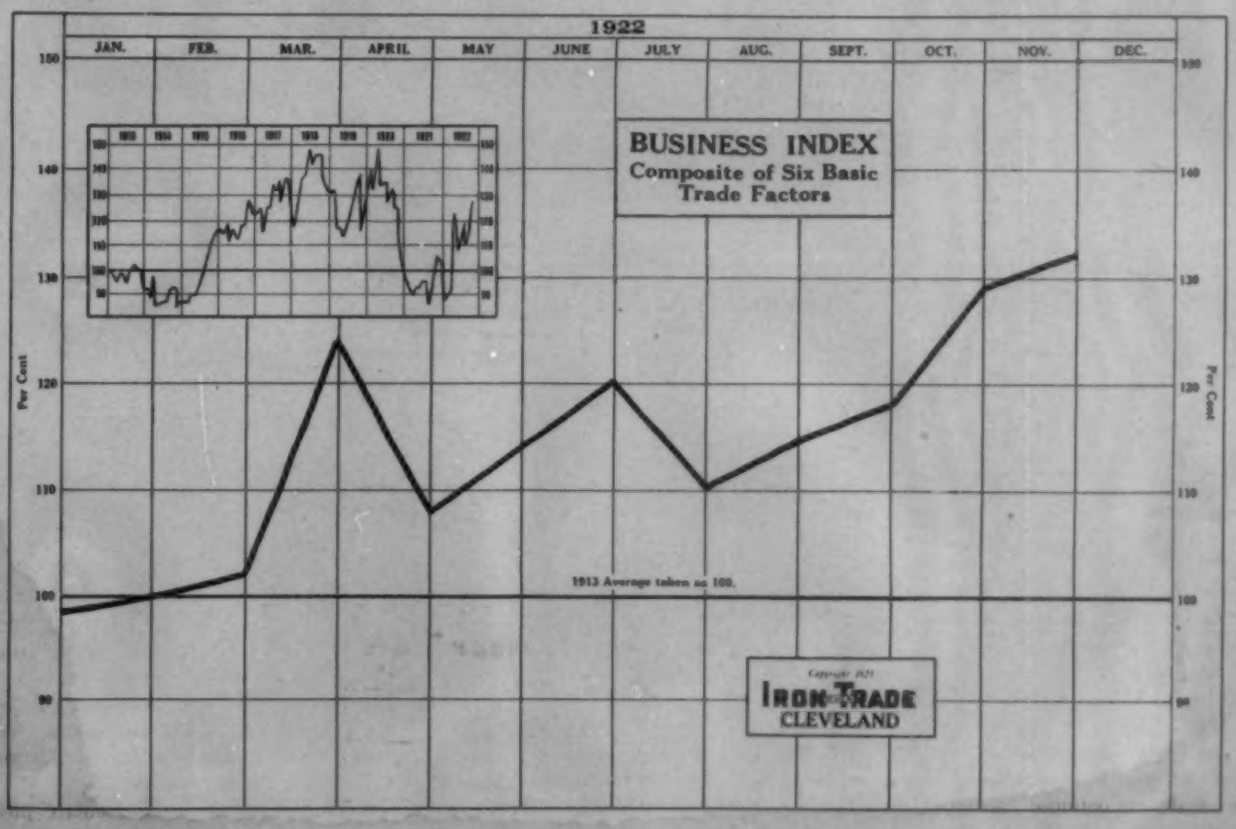
Adverse influences, however, without controlling force now, may become sufficiently acute to check recovery late in the year. Coming events will determine this. Here are favorable and unfavorable elements in the outlook:

Favorable

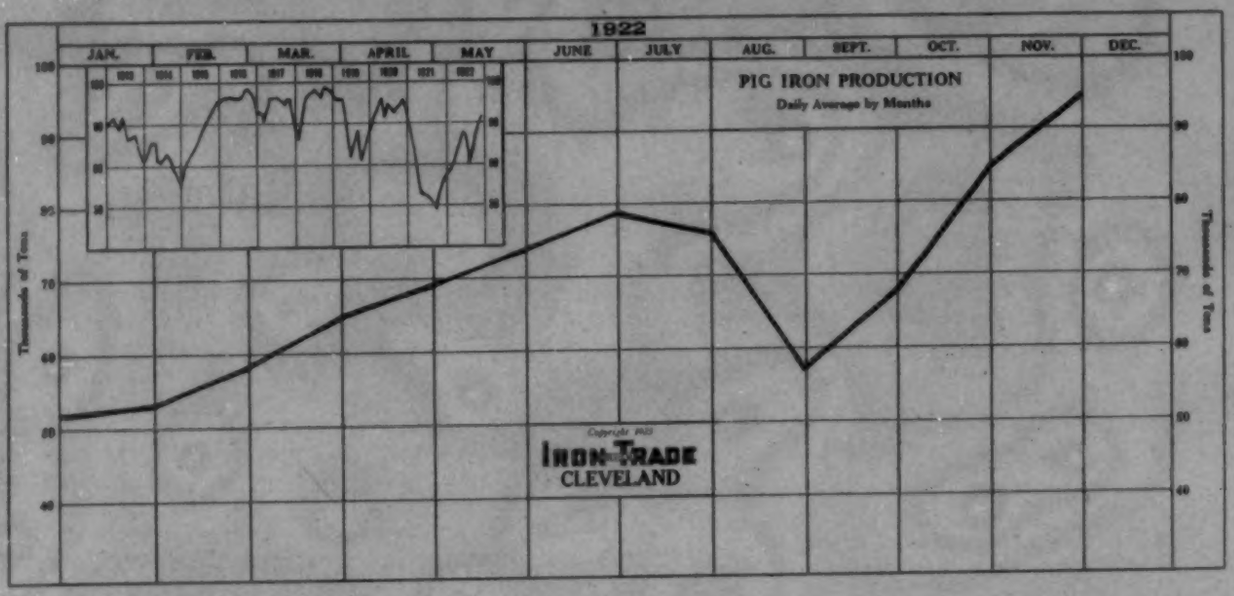
1. Industrial production is at highest level since 1920.
2. Prices are firm and rising.
3. Money is easy; credit resources are stupendous.
4. Crops are excellent; their values 32 per cent above 1921.
5. Employment is widespread.
6. Country's purchasing power is rising.
7. Business profits are expanding.
8. Pig iron and ingot outputs are increasing.
9. Securities are stronger.
10. Foreign exchanges are higher.
11. Railroad traffic, earnings and purchases are better.
12. Building construction is at unprecedented levels.
13. Future buying is replacing hand-to-mouth commitments.
14. Inventories have been liquidated.

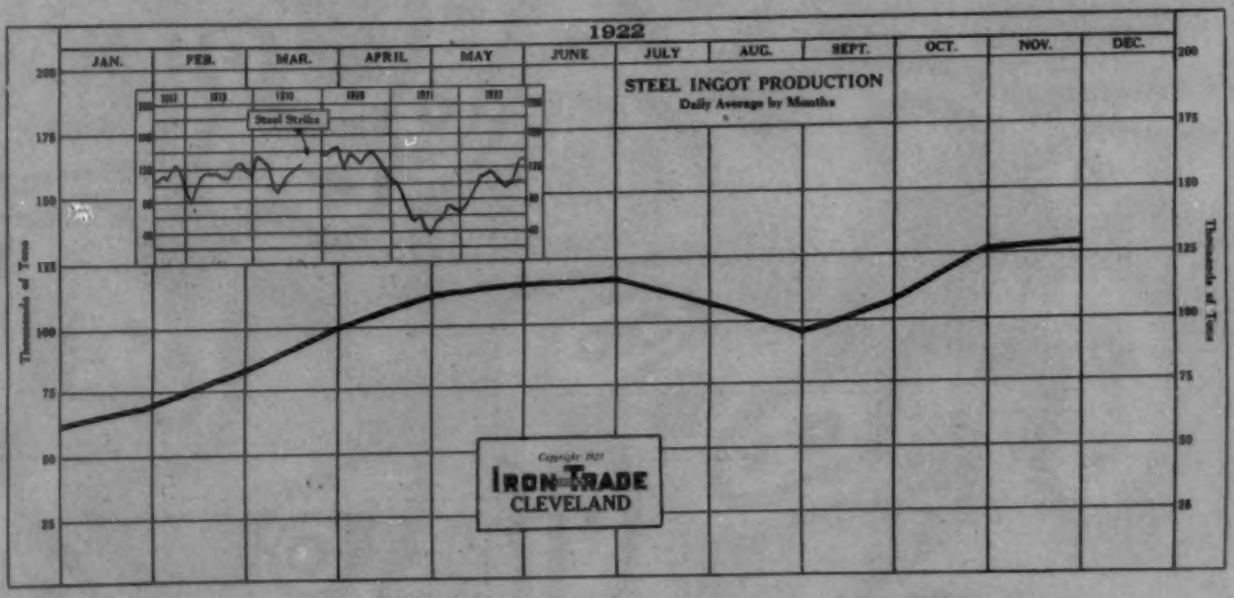
Unfavorable

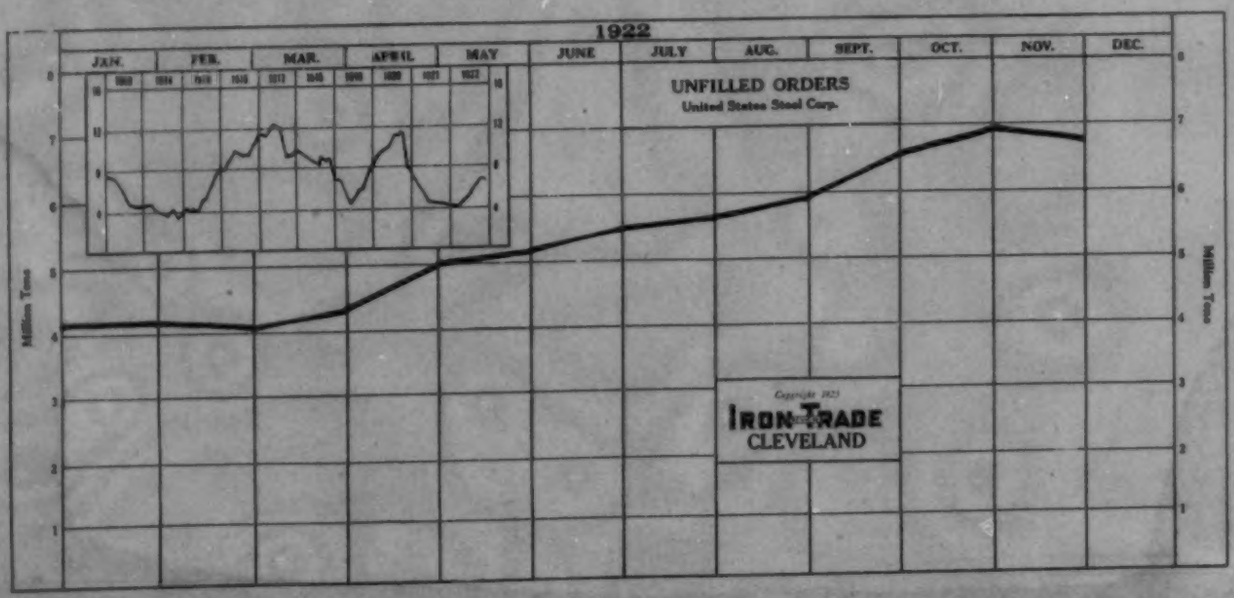
1. Serious labor shortages loom.
2. European poverty may curtail buying power.
3. Farm prices low compared with other commodities.
4. Radical agitation may influence uneconomic legislation.
5. A coal strike is possible.
6. Railroad facilities are inadequate.
7. Gold exports may start soon.



Iron and Steel







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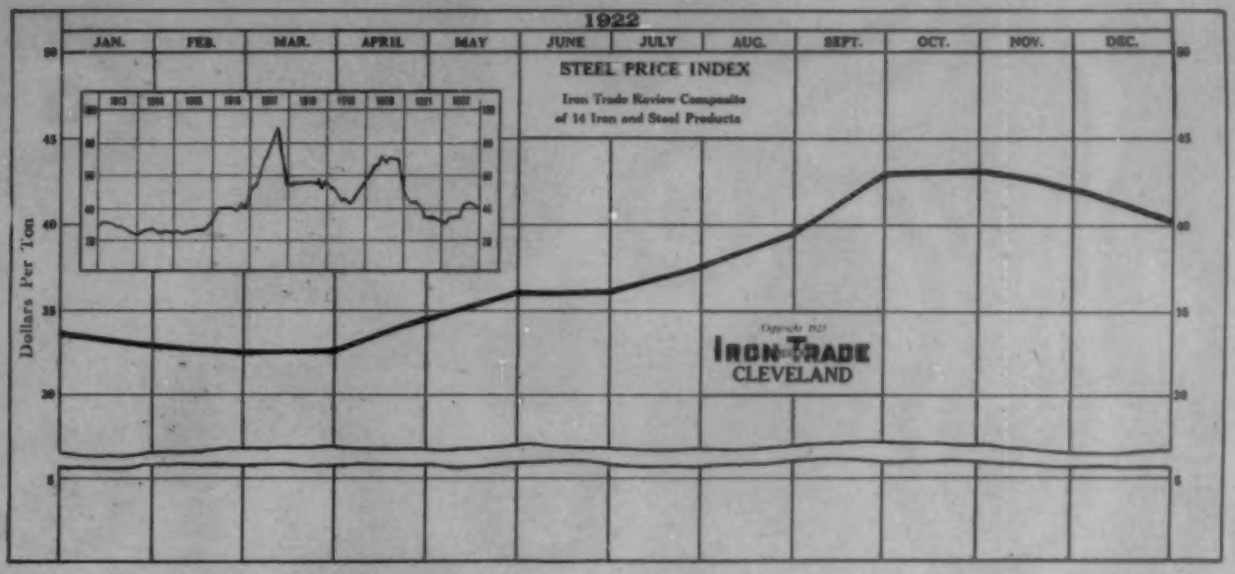
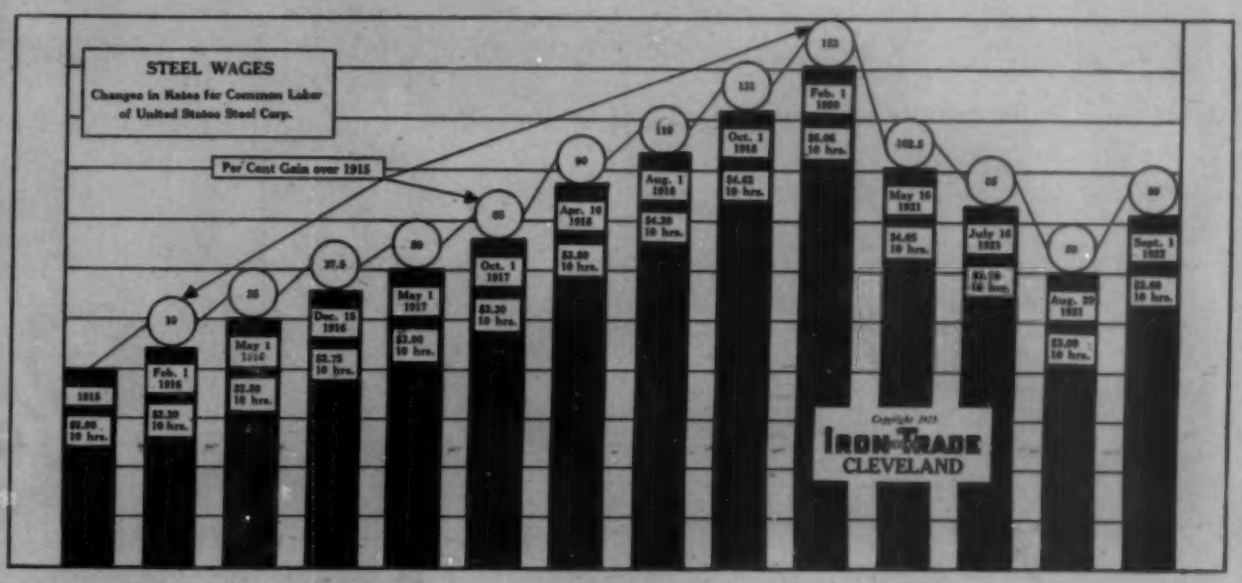
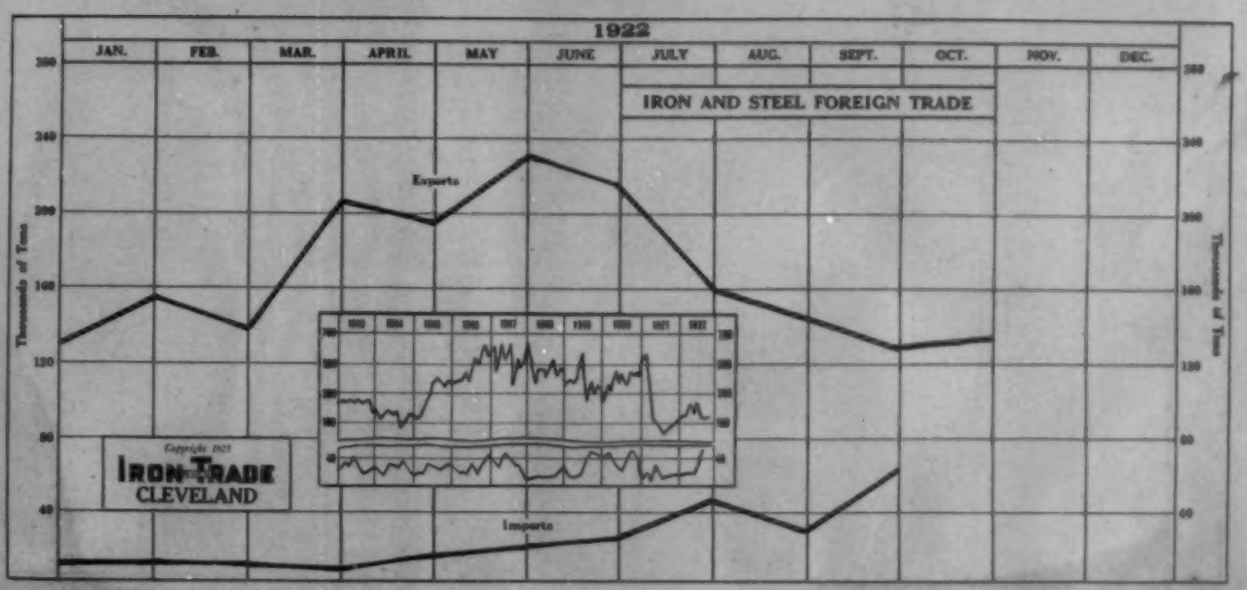
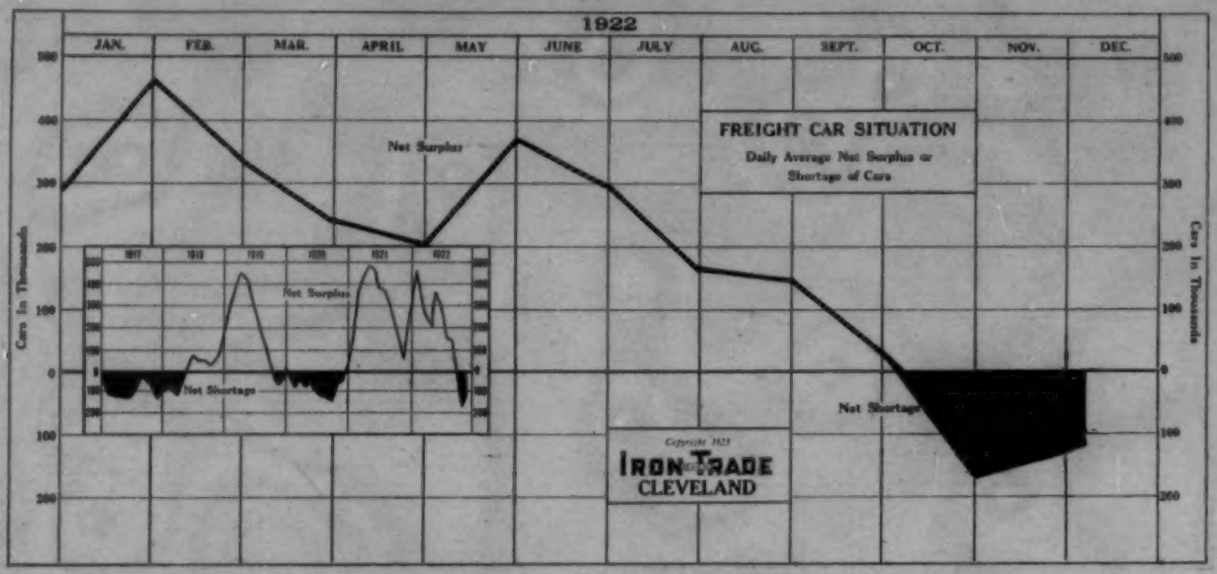
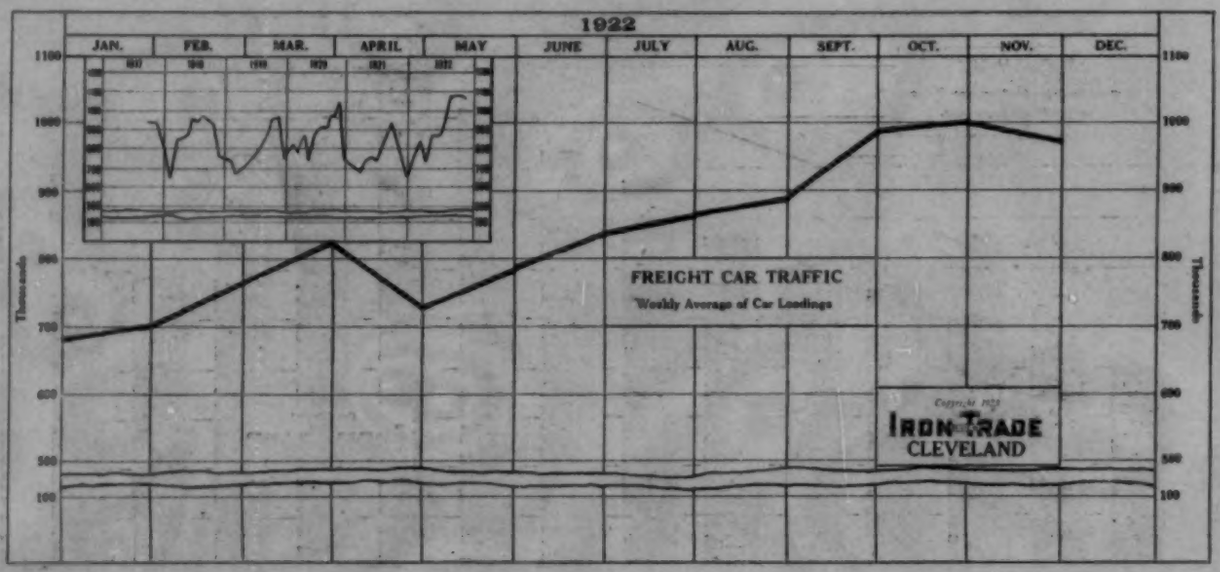


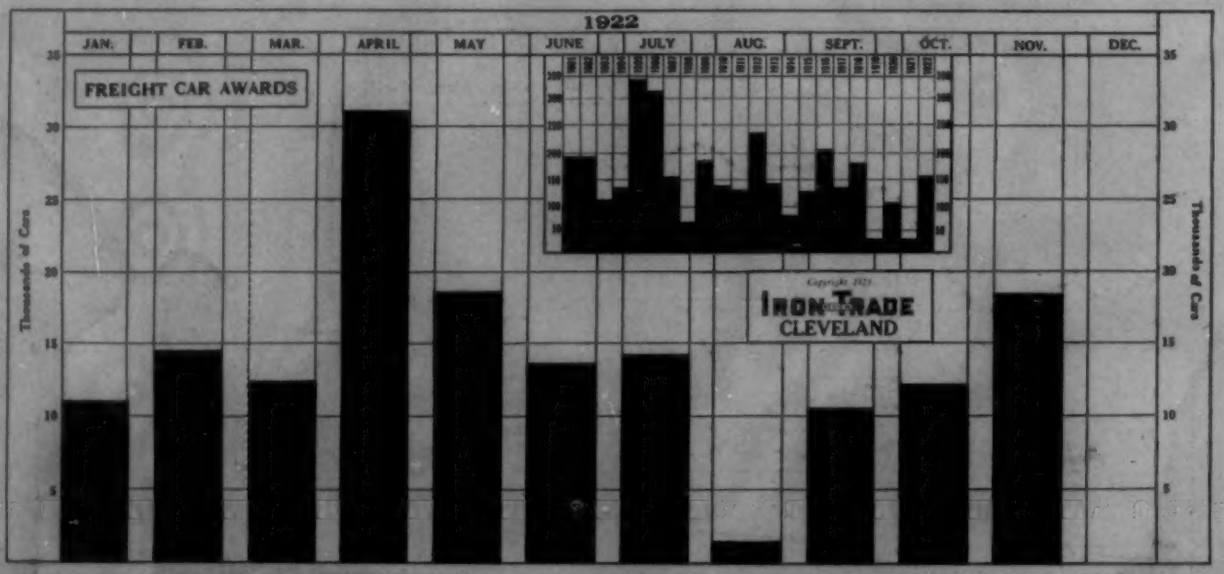




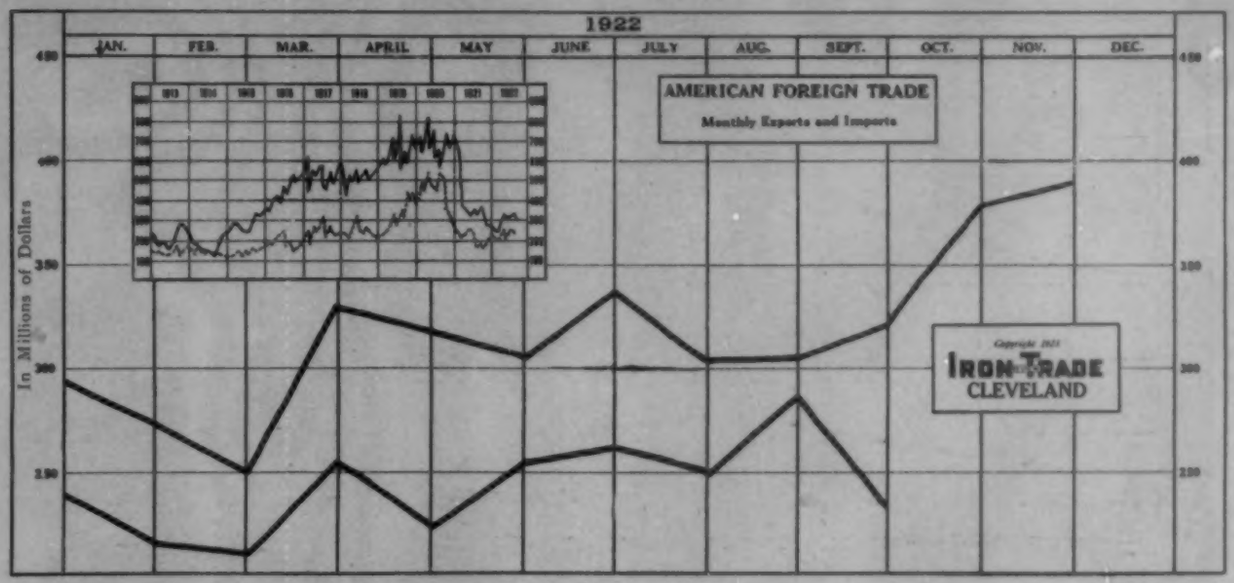
Transportation

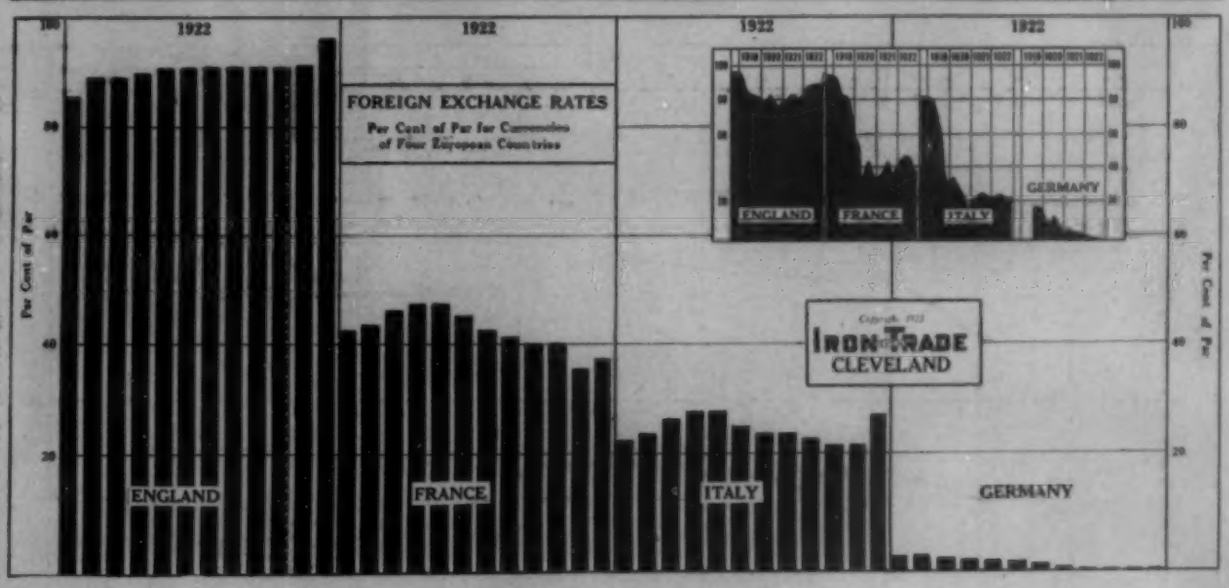




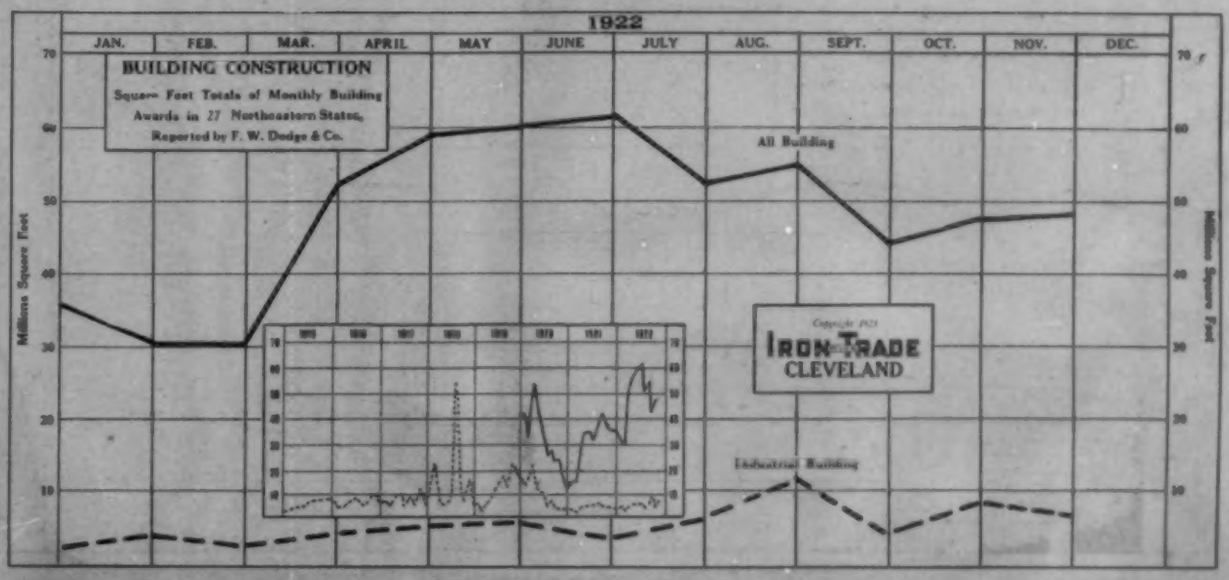


Foreign Trade

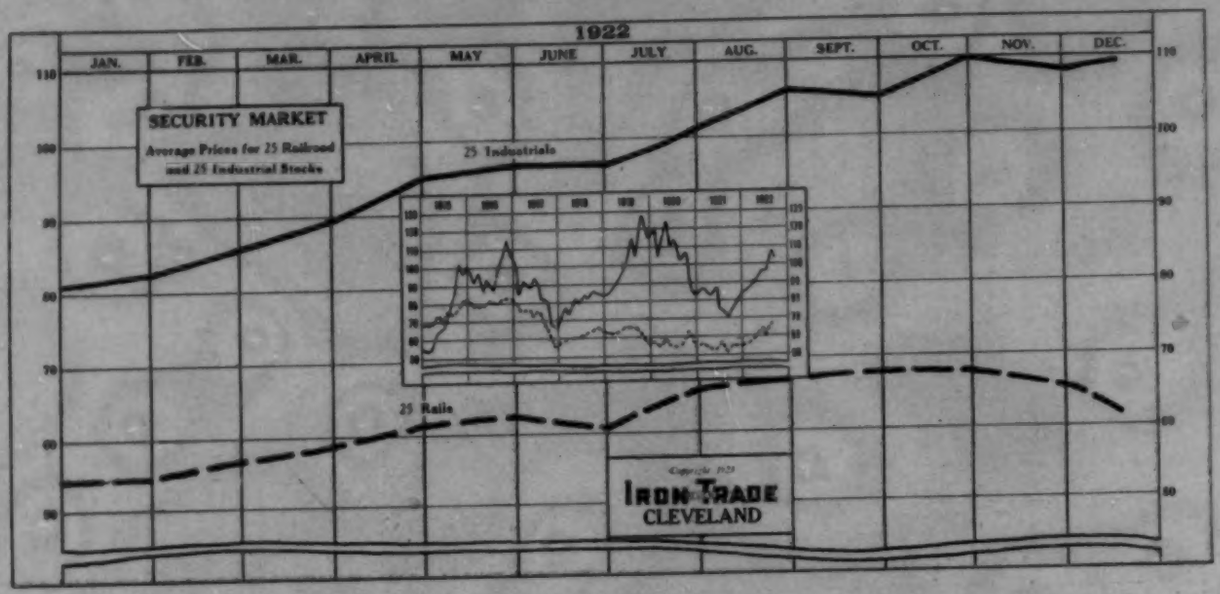


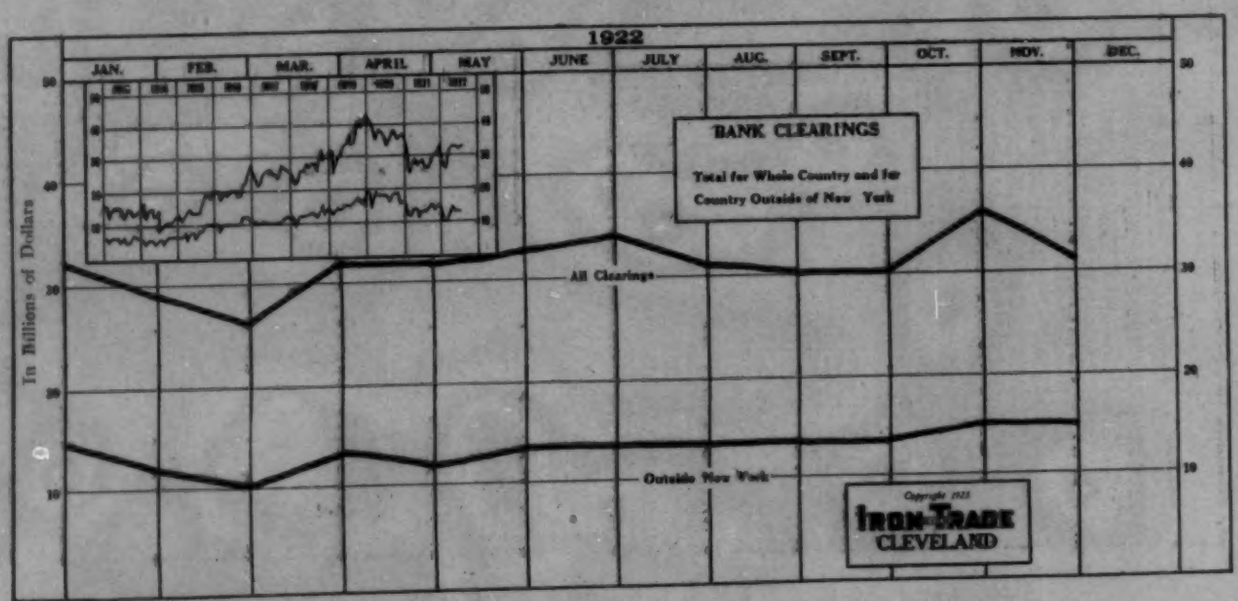


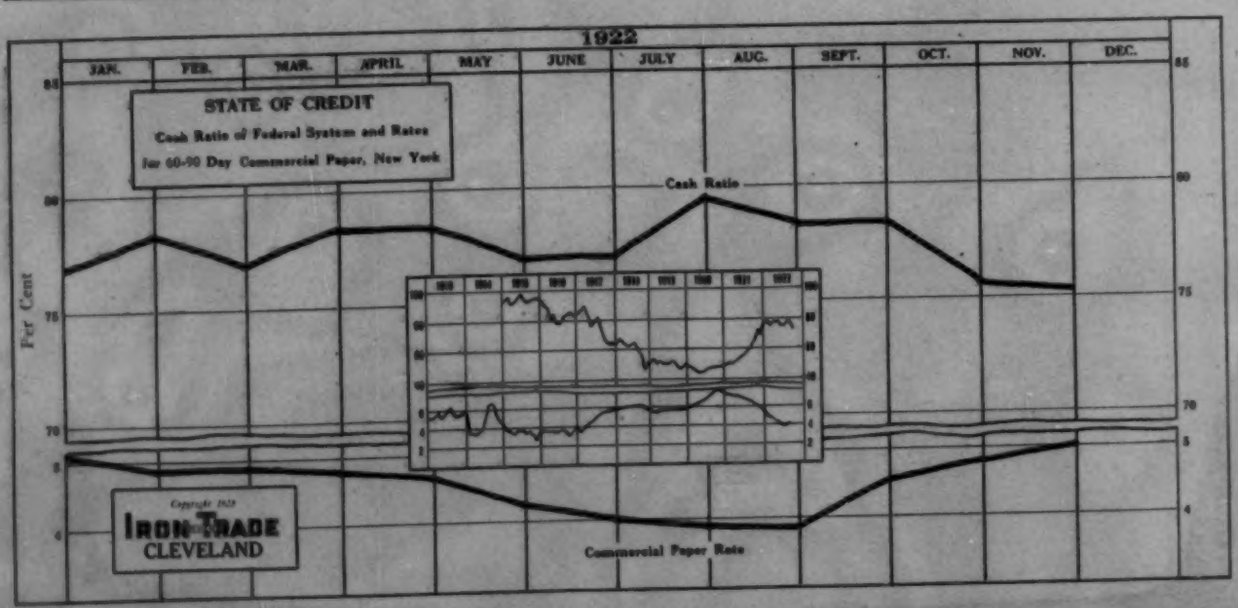
Construction



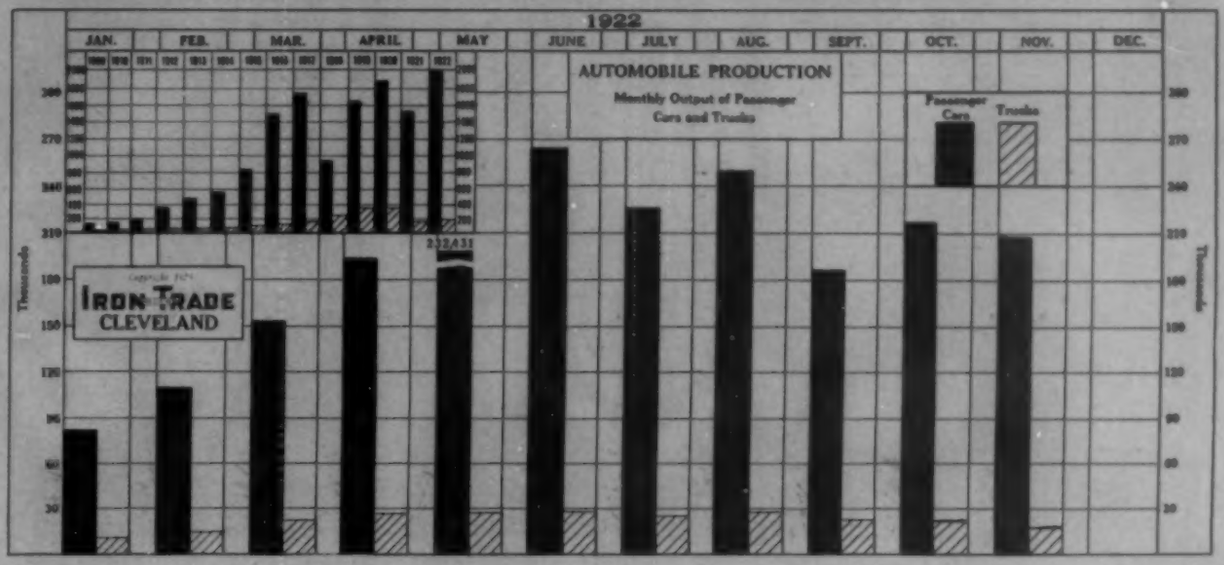
Financial

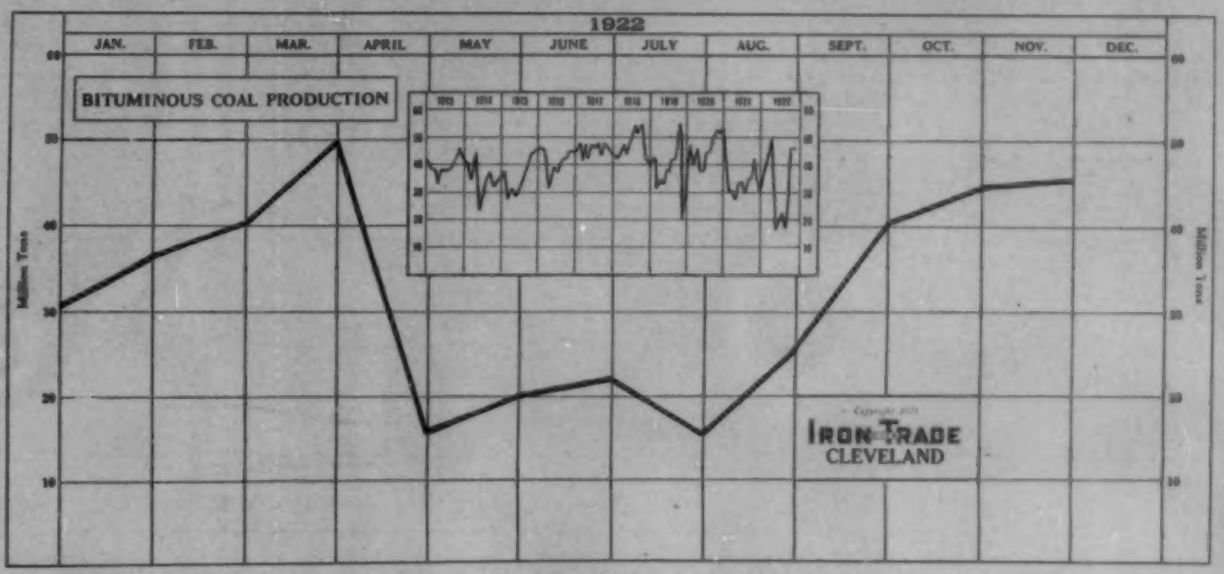

1922
JAN. FEB. MAR. APRIL MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
SECURITY MARKET
Average Prices for 25 Railroad and 25 Industrial Stocks
25 Industrials
25 Rails
IRON TRADE
CLEVELAND

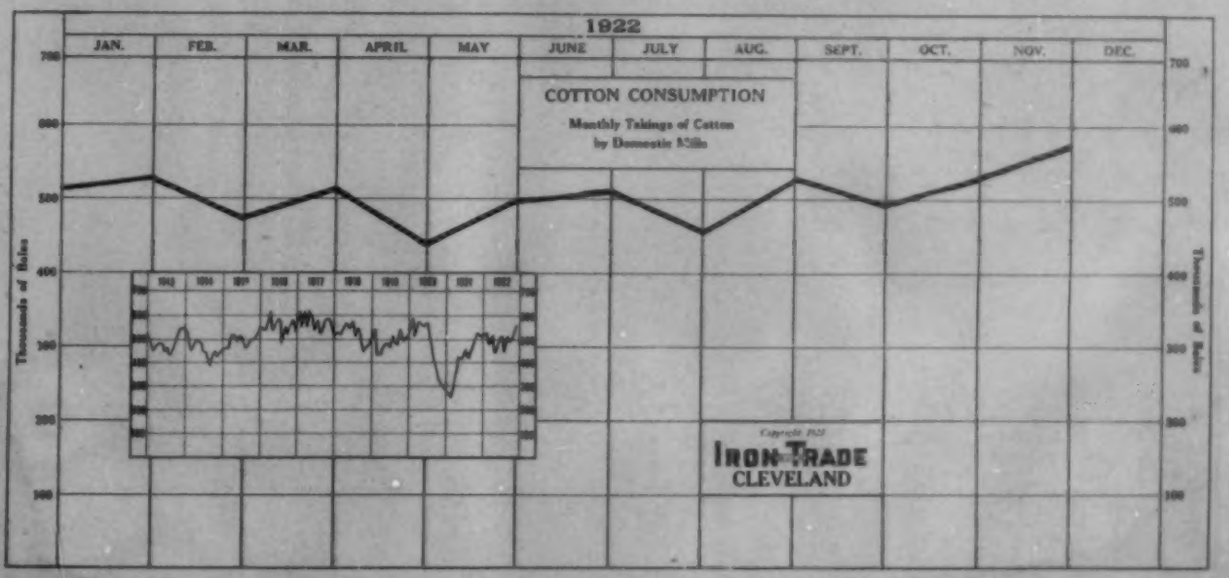

1922
JAN. FEB. MAR. APRIL MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
In Billions of Dollars
BANK CLEARINGS
Total for Whole Country and for Country Outside of New York
All Clearings
Outside New York
IRON TRADE
CLEVELAND


1922
JAN. FEB. MAR. APRIL MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
Per Cent
STATE OF CREDIT
Cash Ratio of Federal System and Rates for 60-90 Day Commercial Paper, New York
Cash Ratio
Commercial Paper Rate
IRON TRADE
CLEVELAND

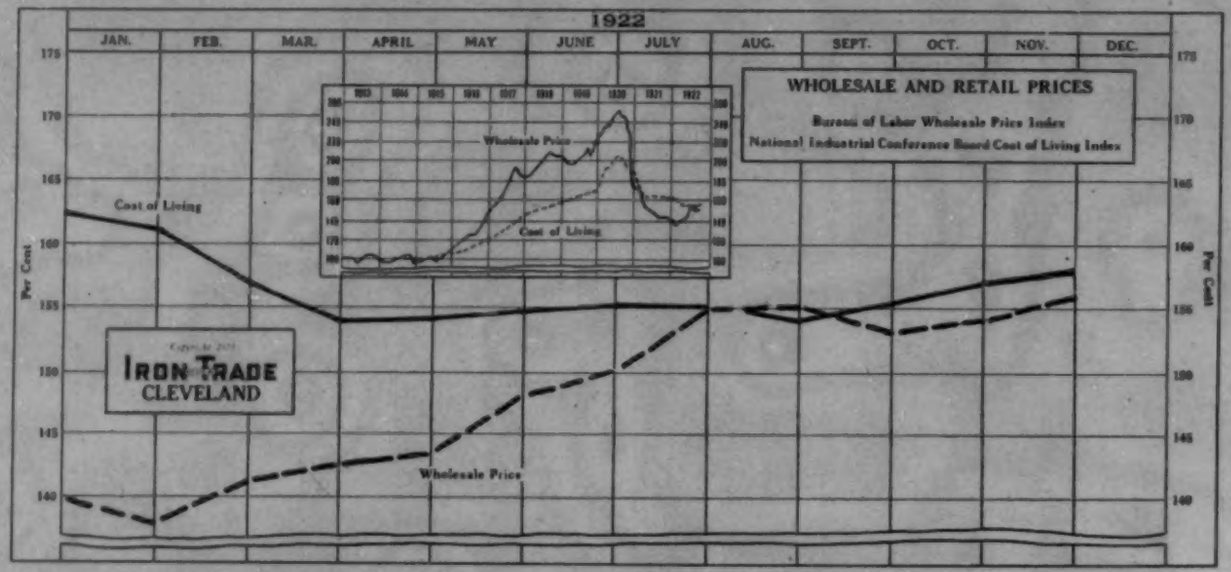
Industrial Production

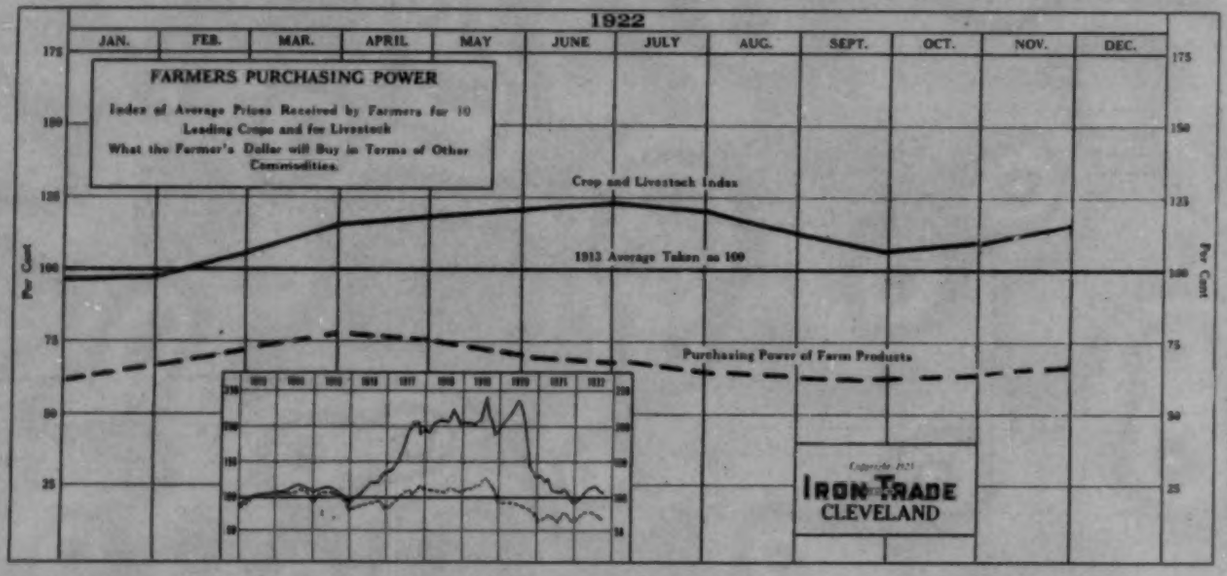




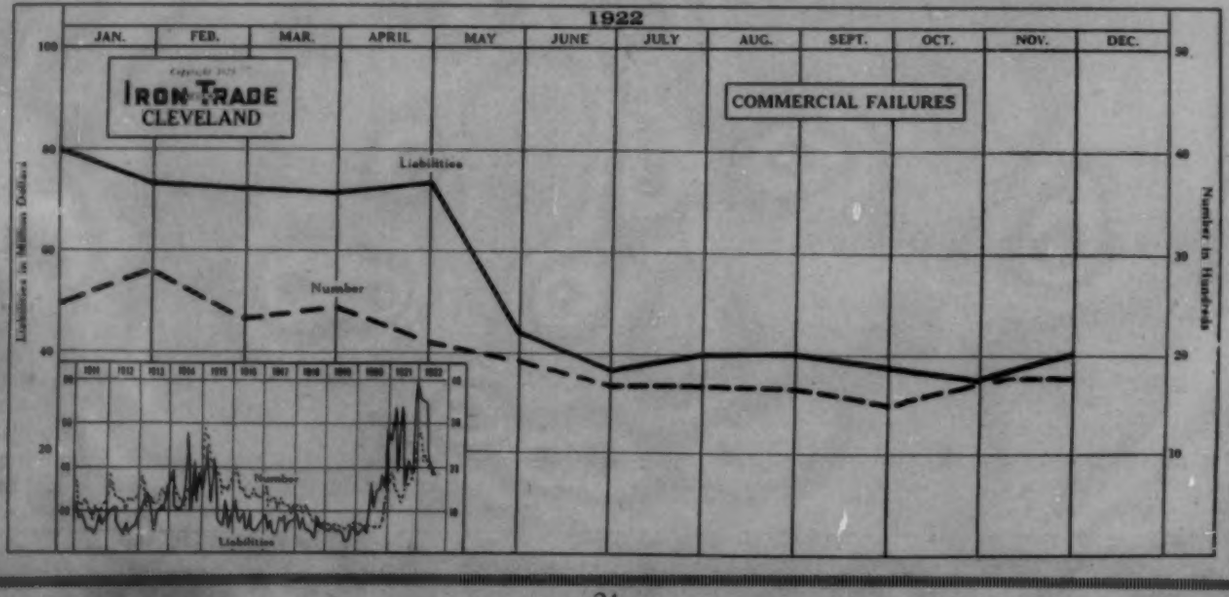


General Prices





Insolvencies



sibility of a return to prewar price levels.

2. That a restoration of prewar price relationships between commodities is not essential to trade activity. Maladjustments abound yet business has revived.

3. That violent and swift fluctuations in finance and trade are to be expected as a result of the war and postwar economic upheavals and unsettlements.

Many economists believe that the long range trend of prices will be toward the prewar basis. Large gold stocks, the certainty of continued high taxes, and the apparent ability of powerful labor unions to resist wage deflation, will combine to postpone extended deflation, however. Fluctuations seem most likely to be around a basis considerably above the 1913 level, for some years to come.

While wholesale values have been rising, living costs have fallen. This is in accordance with the well known principle that retail price movements are always in arrears of raw material and wholesale changes. At the present time the cost of living is actually about 4 per cent lower than it was one year ago. This fact considered together with greater employment, higher wages and better incomes for farmers means that the country's purchasing power has been greatly enhanced in recent months. Increased consumption of goods has resulted.

Production is the primary basis of all wealth and of all purchasing power. It is a fact of fundamental significance, therefore, that industrial output has been steadily increasing for more than a year. Last fall the production of the following commodities reached the highest levels since 1920: pig iron, steel ingots, copper, zinc, cement, coke, maple flooring, petroleum and textiles.

Pig iron production in November was 250 per cent more than in July, 1921. November automobile output was double that for the same month one year before. More cotton was consumed by domestic mills in November than for any month since October, 1917. Building construction was the greatest for any November since 1919. This increased volume of activities stands as an unmistakable indication of great business improvement. Moreover it is a promising augury for the coming months.

Two great obstacles loom. One is the labor shortage and the other is the inadequacy of railroad facilities. Some important steel executives regard the prospective labor shortage next spring as the most serious problem to be faced. Back of the labor shortage is the policy of immigration restriction framed by congress largely at the behest of union labor.

Before the war an average of 925,000 aliens came to this country every year. Now the number arriving is limited to about 350,000. Formerly industries and the farms depended upon European immigrants for their new labor supply. Few laborers are included among those now arriving and last year actually more laborers departed than arrived.

What will be the economic effect of this situation? Its beginnings have already been seen in the upturn of wages last fall. During the deflation period, wages were falling. This decline was checked last summer and during the early fall increases outnumbered reductions by 10 to 1. Next spring may witness a renewed scramble for help. That may mean an upbidding of wages and a resulting inflation of production costs and prices to unhealthy levels.

Business profits now are rising. Next year promises to restore fair earnings to most soundly operated industries. Such a prospect might be blocked, however, by prohibitive wage scales. Some leading economists foresee in this scarcity of labor and its consequences, the real danger to sustained business prosperity. Col. L. P. Ayres, of the Cleveland Trust Co., maintains that although all previous periods of prosperity have been terminated by a stringency of credit, this one will be cut short by exhaustion of the supply of labor. Another influx of southern negro labor to northern centers as in 1920 already is beginning. This development together with rapid strides in the production of new labor-saving machinery may relieve the situation. It remains, however, as one of the factors to be closely watched during the coming year.

The experience of last fall clearly demonstrated the inefficiency of present railroad facilities to provide for a pronounced and extended expansion of trade. Although car loadings at the peak were slightly under the record levels in 1920, the daily average car shortages reached the highest levels ever known. The reason for the present deplorable state of the railroad equipment is plain in the light of recent transportation history.

Railroads Are Weak Factor

From the beginning of the present century to the war period, railroads purchased an average of 180,000 new cars every year. During the three years, 1919, 1920 and 1921 average orders were 40,000. In 1921 the number of new cars ordered by domestic roads was about 22,000. This year the showing has been vastly better. During 11 months 157,000 cars were purchased, and prospects are good for continued heavy buying.

The roads cannot soon bring their facilities up to the expanded needs of the country, however. Industrial capacity is believed to have expanded about 35 per cent since 1913. Railroad mileage in operation is just where it was a decade ago. The outlook for the roads is not improved by the proposals for various restrictive measures applied to the transportation systems which are emanating from radical groups in congress. Such agitation only will serve to further alienate from the roads the capital so essential to their upbuilding and maintenance. A mistaken public policy toward the roads is responsible for their present plight.

It is an economic axiom that business prosperity cannot be long sustained without accompanying good times in the agricultural sections of the country. This is true because people living on the farms comprise one-third of the country's population. For many months the purchasing power of the farmer in terms of other commodities has been extremely low. The prices of the things produced on the farms were falling, while other prices were rising. Improvement began early last fall, however, and has continued in pronounced fashion ever since. As a result the crippled buying power of the farmer is being repaired. If present indications are borne out he should enjoy a fair degree of prosperity.

Crops are large. Out of 20 leading harvests, 16 were greater this season than in 1921. Eleven exceeded the 5-year average from 1916 to 1920. The value of all crops of over $7,000,000,000 is 32 per cent greater than in 1921. Since September wheat has advanced 35 per cent and corn over 80 per cent. Cotton is up 130 per cent from the 1921 low point. The value of the wheat and corn crops alone has been enhanced by $1,000,000,000 in the last few months. In the South the cotton planters are enjoying the best times since the war period.

The upturn in prices for farm products is largely due to the shortage of food production in Europe this year. This country normally sends 11 per cents of its total agricultural output to Europe. The market for that margin of surplus is a dominating factor in establishing the price level for all crops. Present prospects of greater consumption and some improvement in the buying power of Europe have combined to strengthen the values of American farm products.

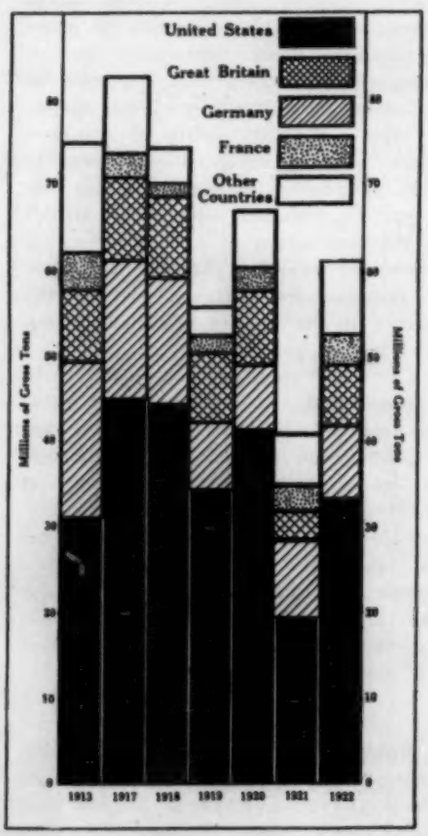
World Output Has Big Gain

Production of Pig Iron Last Year Was 70 and of Steel 75½ Per Cent of Total Capacity, Compared with 50 Per Cent in 1921—Still Below Prewar Basis

LED by the United States, almost every nation made a substantial gain in both pig iron and steel production last year. According to statistics compiled by IRON TRADE REVIEW through its editorial organization in America, Europe and the Far East, 50,140,000 gross tons of pig iron and 60,250,000 gross tons of steel ingots and castings was made throughout the world in 1922. This compares with revised figures of 34,700,000 tons of pig iron and 41,861,000 tons of steel in 1921. The gain in the output of pig iron last year was 44½ per cent and that of steel ingots and castings 44 per cent. The figures, however, remain less than those for 1920, so far the most active postwar year, when 58,854,000 tons of pig iron and 67,145,000 tons of steel was produced.

The interesting feature of the current estimates is found not so much in the increases shown over 1921, as in the opportunity to make for the first time a survey of the world's production of iron and steel for a decade—from 1913 to 1922 inclusive. Covering as it does the period from before the war, through the conflict itself to the present time, this span of ten years has probably witnessed the making of more history, both politically and industrially, than will occur again in half a century. This period is doubly interesting because it covers not only the four years of world war but an equal amount of time since. It would seem from a study of the figures in Table I that a long time is going to elapse before the less imperative demands of peace and industrial development will call for as much iron or steel as was so urgently needed for the clash of arms. In fact the world has not yet reached the stage, by a considerable margin, where it is using even as much iron and steel as it was before the war. In round numbers the 1922 pig iron production was 26,450,000 gross tons less than in 1913, and the steel production 14,377,000 tons less. This relatively weak showing in the production of a basic commodity of great value is a true measure of the essential poverty of the postwar period. The output of pig iron is lagging behind that of steel. This is due in part to the greater flexibility of the steelmaking processes, but more particularly because since the war almost every country has been reworking huge tonnage of war scrap into steel instead of making new pig iron out of ore. Viewed broadly it is fortunate that some of the war's wreckage may thus be reclaimed for productive purposes, and an equivalent amount of the world's supply of iron ore conserved, although in the process the iron and steel industry has been thrown out of balance and the ore and pig iron branches made to suffer unduly.

In the figures given in Table I, the production for 1922 has been estimated, the calculations in the case of all the principal countries except Germany being based on returns for 10 or 11 months. The figures presented a year ago for 1921 have been revised in the light of complete returns and those for 1920 also slightly adjusted. The only important adjustments in the figures for 1920 and 1921 cover those for Germany. Official figures of German production up to November, 1919, were published in detail in IRON TRADE REVIEW, April 15, 1920. Since then official statistics have been suppressed, and although in answer to the demand of the reparations commission, Germany last spring promised to publish statistics of production of essential commodities, she has not yet complied. The revised figures given herewith are based on those of the semi-official *Wirtschaft und Statistik and Stahl und Eisen*, checked against figures showing iron ore and coal production and imports, and supplemented by private reports from important official sources in Germany. On account of the Geneva decision regarding Upper Silesia it also has been necessary to take off some of Germany's production and add it to Poland. This probably will be the last change to be made on account of the alterations in national boundaries growing out of the war. Because of its relative independence of depressing European conditions, the Ameri-



HOW PRINCIPAL PRODUCING NATIONS CONTRIBUTE TO WORLD'S STEEL OUTPUT

can production of both pig iron and steel showed greater recovery last year than that of the Old World. The United States is once more making more than half the world's total of the primary ferrous metals. From only 47½ per cent in 1921, the American proportion of the world's output of pig iron rose last year to 53½ per cent. Out of a total of 49,790,000 gross tons, the United States contributed 26,850,000 tons. In an estimated total steel production in 1922 of 60,250,000 tons, the share of the United States was 33,000,000 tons. In other words, in 1922 the United States produced 54.8 per cent of the world's steel compared with 49 per cent in 1921, 62 per cent in 1920.

Last year the United States produced more steel than before the war. This was not the case in Europe where the problem of reconstruction still contains many unsolved factors.

Last year the production of pig iron in Europe as a whole was more than in 1920 and therefore at the highest point since the war. This shows that real progress is being made toward reconstruction. The production of the western European nations showed big gains last year compared with 1921. Central Europe, except Czecho-Slovakia, also made progress, especially Poland on account of the acquisition of the plants in Upper Silesia. Russian production of pig iron crept up to 125,000 tons and that of steel to 215,000 tons.

In the future India and the Far East will be worth watching. In the former country considerable new construction is going forward. China and Japan now have sufficient capacity to make nearly 1,250,000 tons of pig iron a year.

As Table II shows, international trade in iron and steel improved last year, the total exports of the five principal countries being estimated at 10,688,400 gross tons compared with 8,461,677 tons in 1921, imports also increasing from 3,300,300 tons in 1921 to 4,100,000 tons in 1922. International trade as a whole is still only about two-thirds of the pre-war volume.

Table I

The World's Production of Iron and Steel

Before, During and Since the War—Gross Tons

Pig Iron

Countries	1922	1921	1920	1919	1918	1917	1913
United States	26,850,000	16,506,000	16,401,000	30,600,000	38,400,000	38,100,000	30,600,000
Canada	400,000	617,000	974,000	815,000	1,060,000	1,045,000	1,015,000
Great Britain	4,865,000	2,611,000	8,035,000	7,398,000	9,086,000	9,322,000	10,260,000
France	4,900,000	3,308,000	3,380,000	2,374,000	1,286,000	1,707,000	5,126,000
Belgium	1,560,000	862,000	1,112,000	247,000	.....	8,000	2,428,000
Luxemburg	1,625,000	955,000	696,000	600,000	.....	.....	.....
Italy	100,000	50,000	90,000	240,000	309,000	463,000	420,000
Spain	175,000	175,000	200,000	.....	.....	.....	.....
Sweden	350,000	304,000	463,000	489,000	738,000	816,000	718,000
Germany	6,500,000	6,096,000	5,568,000	6,192,000	11,672,000	12,931,000	19,000 000
Austria	305,000	222,000	100,000	.....	.....	2,000,000	2,343,000
Czechia	345,000	535,000	640,000	.....	.....	.....	.....
Poland	640,000	640,000	100,000	.....	.....	.....	.....
Hungary	115,000	50,000	30,000	.....	.....	.....	.....
Russia	125,000	115,000	15,000	.....	.....	1,500,000	4,484,000
Japan	310,000	654,000	700,000	265,000	.....	.....	.....
China	500,000	600,000	.....	.....	.....	.....	.....
India	375,000	250,000	300,000	265,000	.....	.....	.....
Miscellaneous	100,000	150,000	50,000	100,000	1,200,000	1,000,000	200,000
Total	50,140,000	34,700,000	58,854,000	49,585,000	63,751,000	68,892,000	76,594,000

Steel Ingots and Castings

United States	33,000,000	19,744,000	42,100,000	34,700,000	44,500,000	45,000,000	31,300,000
Canada	550,000	667,000	1,109,000	920,000	1,690,000	1,562,000	1,048,000
Great Britain	5,800,000	3,626,000	9,067,000	7,894,000	9,539,000	9,717,000	7,664,000
France	4,365,000	3,010,000	3,002,000	2,151,000	1,780,000	2,196,000	4,614,000
Belgium	1,460,000	780,000	1,216,000	336,000	12,000	10,000	2,428,000
Luxemburg	1,375,000	747,000	588,000	385,000	.....	.....	.....
Italy	450,000	350,000	774,000	732,000	976,000	1,311,000	918,000
Spain	150,000	100,000	150,000	.....	.....	.....	.....
Sweden	300,000	203,000	475,000	462,000	517,000	572,000	582,000
Germany	9,000,000	8,700,000	6,624,000	7,644,000	14,738,000	16,322,000	18,631,000
Austria	430,000	329,000	125,000	.....	.....	2,872,000	2,584,000
Czechia	640,000	895,000	1,000,000	.....	.....	.....	.....
Poland	1,475,000	1,476,000	60,000	.....	.....	.....	.....
Hungary	150,000	90,000	40,000	.....	.....	.....	.....
Russia	215,000	161,000	45,000	.....	.....	2,000,000	4,760,000
Japan	460,000	558,000	470,000	.....	.....	.....	.....
China	120,000	150,000	.....	.....	.....	.....	.....
India	210,000	175,000	200,000	.....	.....	.....	.....
Miscellaneous	100,000	100,000	100,000	.....	300,000	1,088,000	100,000
Total	60,250,000	41,861,000	67,145,000	55,224,000	74,052,000	82,650,000	74,629,000

Figures for Germany include Luxemburg prior to 1919; figures for Austria prior to 1919 include the major portions of Czechia and Hungary; Poland's production prior to 1919 is covered in the figures for Germany and Russia; since 1920 Poland's figures include most of Upper Silesia.

Table II

Exports and Imports of the Principal Countries

Gross Tons—Scrap Eliminated

	Exports				Imports			
Country	1922	1921	1920	1913	1922	1921	1920	1913
United States	1,975,000	2,217,777	4,963,000	2,746,000	360,000	83,900	402,000	245,000
Great Britain	3,287,400	1,700,400	3,253,000	5,049,000	865,000	1,646,000	1,108,000	2,231,000
Germany	2,343,500	2,110,000	1,751,000	5,664,000	1,750,000	621,400	419,000	284,000
France	1,770,600	1,529,900	895,000	578,000	650,000	434,800	1,068,000	155,000
Belgium*	1,311,900	903,600	891,000	1,546,000	475,000	514,200	804,000	827,000
Total	10,688,400	8,461,677	11,753,800	15,583,000	4,100,000	3,300,300	3,801,000	3,742,000

*Includes Luxemburg from July 1, 1922.

FINDING THE FACTS IN A GREAT INDUSTRIAL PROBLEM

Indicating the trend of the times toward impartial investigation of industrial conditions on which the security of the nation rests, is the federal commission authorized by congress to inquire into coal mining. In the picture, left to right, are: Judge Samuel Alschuler of Aurora, Ill.; George Otis Smith; Thomas R. Marshall, former vice president; John Hays Hammond; Charles P. Neill and Clark Howell. Dr. Edward T. Devine, the seventh member, is absent

Labor Status Reversed in Year

Period of Unemployment Succeeded by Widespread Shortage of Skilled and Unskilled Workmen, with Sharp Increases in Wages—Ban on Immigration Threatens More Serious Difficulties—Basic Factors Traced

HIGHER wage rates, accompanied with a scarcity of men, are the outstanding features of the labor situation today, as reversed from the position one year ago. The outlook is for a continuation of the upward trend of wages and still greater shortage of labor. A larger supply of labor for the iron and steel industry has been made available through the effect of seasonal changes in other occupations, but employers cannot see in this any permanent advantage.

In practically all lines of employment in the iron and steel and related industries wages today are higher than a year ago, many of them registering gains of 20 to 50 per cent. In few other years have there been such wide variations in the wages paid certain classifications of workmen as in 1922. During the spring common labor could be had at 18 to 20 cents an hour in the same localities where in the last few months the wage has been as high as 45 cents.

The unemployment problem did not extend further than beyond the first quarter of 1922. In March a shortage of labor was noted in some western cities, and by April there was a fairly pronounced shortage of labor in steel mills and metalworking establishments. This was especially true in regard to skilled labor, and the consequence of bidding for men was to start wages on the upward trend. The higher wages served to bring out a larger number of men.

Leaders in the iron and steel industry can see no hope of permanent relief from the labor shortage until immigration restrictions are modified. While the annual increment through immigration in the five years preceding the war averaged 925,000 persons, the number actually admitted during the fiscal year 1921-22 was 243,953 or 68 3/10 per cent of the total number admissible during the year. In the first 16 months of the operation of the 3 per cent act the net gain through immigration was 235,144, of whom many were women and children.

Wage Rates in General Manufacturing

	All around machinists, hiring rate per hour	Common labor per hour
Milwaukee	$0.60 to .65	$0.30 to .37
Racine	.67½	.35 to .45
Moline	.45 to .65	.30 to .35
Chicago	.65 to .75	.40 to .45
St. Louis	.50 to .77	.30 to .41
Memphis	.77	.25
Muskegon	.40 to .60	.30 to .45
Grand Rapids	.55 to .70	.35 to .40
Lansing	.50 to .60	.40
Battle Creek	.50 to .65	.30 to .40
Jackson	.62	.37½
Saginaw	.55 to .72½	.32 to .45
Flint	.55 to .65	.40 to .42½
South Bend	.55 to .75	.40 to .45
Fort Wayne	.50 to .64	.35 to .40
Indianapolis	.45 to .55	.30 to .35
Louisville	.55 to .75	.25 to .30
Nashville	.55 to .65	.20 to .25
Toledo	.65	.36 to .42
Detroit	.65 to .75	.40 to .45
Cleveland	.55 to .65	.35 to .42
Akron	.75 to .85	.30 to .40
Columbus	.45 to .60	.30 to .40
Dayton	.60 to .75	.30 to .40
Cincinnati	.50 to .68	.33 to .40
Youngstown	.45 to .83	.35 to .40
Erie	.45 to .65	.30 to .35
Pittsburgh	.65 to .72	.35 to .40
Toronto	.55 to .65	.35 to .40
Buffalo	.65 to .72	.40 to .45
Rochester	.60 to .70	.40 to .48
Philadelphia	.55 to .65	.30 to .45
Wilmington	.50 to .60	.25 to .35
Newark	.55 to .65	.35 to .42
Albany	.50 to .75	.30 to .40
New York	.60 to .70	.35 to .40
Bridgeport	.50 to .55	.30 to .35
Hartford	.50 to .55	.30 to .35
Springfield	.50 to .70	.40 to .50
Worcester	.55 to .65	.35 to .40
Boston	.62	.40

The accompanying charts show that there was a net loss of 56,853 of unskilled laborers in the fiscal year ended June 30, 1922. Compilations indicate that the net loss of unskilled laborers is continuing at the rate of 5000 to 6000 a month. An analysis of immigration figures recently put out by the Illinois Manufacturers association indicates that the races supplying the bulk of common labor, including Poles, Lithuanians and Rumanians, are returning to Europe, and the races which do not ordinarily engage in industries form the bulk of immigration. The net gain of skilled labor for the fiscal year ending June 20, 1922 was 33,630. As shown by the accompanying chart, there has been a continuous net gain of skilled labor during the last 12 years, while reference to the chart pertaining to unskilled labor will show how there has been an excess of emigration.

Wage increases during 1922 have reflected the shortage of labor. In the period, April 15 to May 15, reductions were recorded in 54 representative industries and increases in but nine. In the next period, ending June 15, 23

representative industries out of 49 reported reductions and 26 increases. The widespread increases were strikingly shown when for the month ending Sept. 15, 119 out of 123 reported increases and only four, reductions.

Wages paid in machine shops in some of the leading manufacturing centers average about 70 per cent over the level of 1914, compared with 55 per cent over that level a year ago. Practically all classifications of machine shop workmen show an advance over Jan. 1, 1922, and the percentages of the advances exhibit considerable variation. Averaged in a general way, the increase is about 15 per cent. Some of the variations are indicated by the accompanying table showing hourly hiring rates for all-around machinists in 41 cities. In Cleveland, for instance, the rate is 50 to 75 cents. In that city, however, 80 per cent of reports from machine shops narrow the range down to 55 to 65 cents. The maximum paid for all-around machinists is shown to be 85 cents in Akron, the next highest rate being in Youngstown, O., with 83 cents. The rates given today are more nearly representative of actual wages paid than were those a year ago, owing to the fact that more men are on full time.

Common labor rates paid in manufacturing industries in the 41 cities listed in the table referred to vary from 20 cents, in Nashville, Tenn., to as high as 50 cents in Springfield, Mass., while the average in the northern industrial districts is 35 to 40 cents.

Only one change was made in the common labor wage rate during 1922 by the United States Steel Corp., when the rate was advanced in September from 30 to 36 cents an hour. A similar advance then became general in common labor rates paid in other iron and steel plants, and in the metal trades. The corporation's rate of 36 cents today is 80 per cent over the 1914 rate, whereas a year ago the rate was 30, or 56 per cent over 1914. The corporation's rate reached the peak, 50.6 cents an hour, on a basis of 10 hours, on Feb. 1, 1920. This was in effect until May 16, 1921, when it was reduced to 40.5 cents. On July 16, 1921, the corporation abolished the practice of paying 50 per cent extra for work over eight hours a day, this bringing the actual hourly rate down to 37 cents an hour. The rate was lowered to 30 cents on Aug. 29, 1921. The standard common labor rate for surface work in the Minnesota iron ore mining district today is 37½ cents an hour.

In four out of 11 foundry centers, Boston, Minneapolis, Cleveland and Indianapolis, the hourly rate paid union molders on Dec. 1, 1922, was the same as one year preceding. The rate in each of these cities is 75 cents an hour, or $6 for an 8-hour day, and the percentage of advance over the rate just prior to the war in 1914 remains the same in each instance, 93.2. In each

Wage Comparisons in Machine Shop

	Average hourly rate, February, 1915	Average hourly rate at peak, 1920	Average hourly rate, Jan. 1, 1922	Present average hiring rate
Toolmakers	$0.40	$0.79	$0.61	$0.65
Machinists	.35	.72	.50	.57½
Lathe hands, under 24-inch	.32½	.65	.45	.51½
Lathe hands, over 24-inch	.37½	.61	.50	.56½
Planer hands, under 36-inch.	.30	.72	.45	.52
Planer hands, larger	.35	.70½	.50	.57
Grinders, rough.	.25	.50	.30	.36
Scrapers	.30	.69	.50	.55
Floor hands	.35	.65	.50	.51
Bench hands	.30	.62	.35	.40
Drill press, ordinary	.25	.54	.30	.40
Drill press, radial	.30	.59	.35	.45
Boring mill	.37½	.72	.55	.56
Screw machine, hand	.25	.55½	.35	.46
Screw machine, automatic	.30	.65	.40	.50
Turret lathe	.32½	.65	.40	.50
Milling machine, hand	.25	.56	.40	.43
Milling, plain	.27½	.63	.45	.50
Milling, universal	.30	.58	.50	.58
Blacksmiths, forge men	.30	.70	.50	.60
Blacksmiths, hammermen	.30	.71	.50	.60
Patternmakers, wood	.35	.92	.70	.75
Helpers	.25	.54	.30	.40
Polishers	.30	.60	.45	.54
General labor	.20	.45	.30	.38

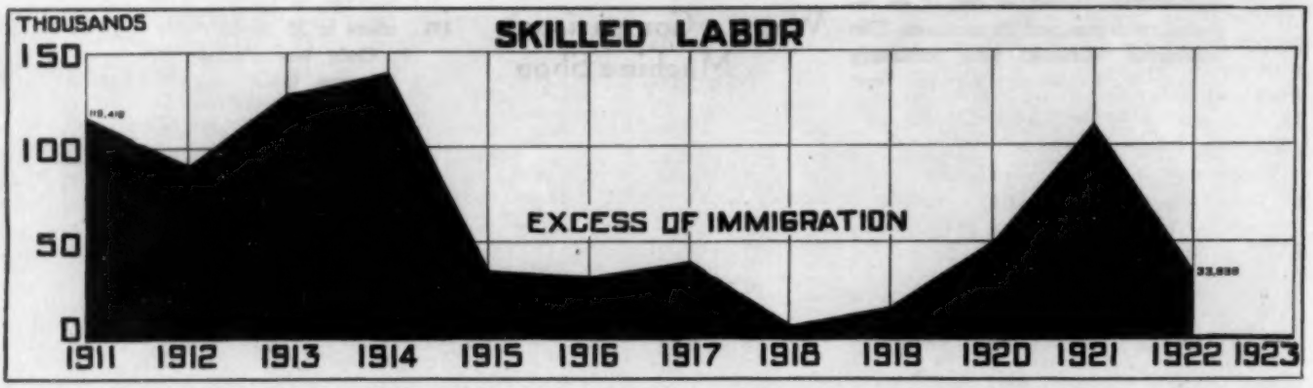
The foregoing averages while taken from the statistics in the Cleveland district are fairly representative of the averages in the largest districts of the country represented in the National Metal Trades association. The comparison is given to indicate the changes in wages applied to the more important classifications. The maximum and minimum hiring rates at present are 20 per cent above to 20 per cent below the average. In 85 per cent of all reports, the minimum or maximum rates paid do not vary over 10 per cent from the above averages in Cleveland.

Rise and Fall of Wages in Great Britain Since 1914

AMERICAN equivalents in all instances are figured on the basis of the standard rate of exchange, $4.86 per pound sterling. The figures represent weekly wages. Percentages represent the increase over August, 1914. A 47-hour week took the place of a 53-hour week Jan. 1, 1919. An increase of 12½ per cent in wages which went in effect Oct. 23, 1917, was taken off in three equal installments, in November, 1921, December, 1921, and January, 1922. A war bonus of 10 shillings a week, in addition to the wages as given below, remains in effect.

	Aug. 1914	March 1915	Sept. 1916	April 1917	Aug. 1917	Oct. 1917	Dec. 1917	July 1918	Aug. 1918	Aug. 1918	Dec. 1918	Jan. 1919	Aug. 1919	Dec. 1919	Jan. 1920	April 1920
Patternmakers	$10.69	$11.66	$12.39	$13.61	$14.34	$16.12	$17.50	....	$18.45	....	$19.81	....	....	$21.14	....	$22.00
Molders	10.45	11.42	12.15	13.37	14.09	15.86	17.22	....	17.99	18.45	19.81	....	....	21.18	....	21.91
Coremakers	8.99	9.96	10.69	12.91	12.64	14.21	15.58	16.38	17.25	....	18.72	....	....	20.09	....	20.91
Fettlers (rough)	10.73	11.80	12.53	13.75	14.48	16.28	17.65	....	17.74	....	19.98	19.94	....	21.31	....	22.19
Grinders	9.66	10.73	11.53	12.60	13.42	15.08	16.59	....	17.51	....	18.64	18.78	....	20.16	....	21.02
Welders	8.75	9.72	10.45	11.66	12.39	13.94	15.31	....	16.06	....	19.01	18.98	....	20.34	....	21.14
Blacksmiths	10.20	11.17	11.91	13.12	13.85	15.58	16.77	....	17.90	....	17.63	....	....	18.97	....	19.81
Blacksmiths' strikers	6.80	7.78	8.51	9.72	10.45	11.75	13.12	....	14.07	....	19.27	....	....	20.63	....	21.45
Fitters and turners	10.21	11.18	12.91	13.12	13.85	15.58	16.80	....	17.90	....	15.43	....	....	16.81	....	17.63
Slotters, shapers and planers	9.23	10.20	10.94	12.15	12.88	14.49	15.80	....	16.81	....	19.27	....	....	20.63	....	21.45
Drillers and borers	....	21.18	....	20.36	....	20.63	14.21	....	15.17	....	18.17	....	....	19.54	....	20.36
Electricians	10.20	11.18	11.91	13.12	13.85	15.58	16.77	....	17.90	....	16.53	....	....	17.90	....	18.72
Electric crane drivers	6.32	7.29	8.02	9.23	9.96	11.21	12.57	....	13.55	....	19.27	....	....	20.63	....	21.45
Laborers	5.71	6.68	7.41	8.63	8.35	10.52	11.88	....	12.85	....	14.89	....	15.16	16.52	....	17.35

	May 1920	June 1920	May 1921	July 1921		Aug. 1921	Nov. 1921	Dec. 1921	Jan. 1922				July 1922	Aug. 1922	Sept. 1922	Per cent above Aug. 1914
Patternmakers	....	$22.82	....	$22.00	....	$21.18	$20.40	$19.61	$18.83	....	....	....	$17.50	$16.16	$14.82	38.6
Molders	....	22.82	....	22.00	....	21.18	20.40	19.61	18.83	....	....	....	17.50	16.16	14.82	42
Coremakers	....	21.73	....	22.00	....	21.18	20.40	19.61	18.83	....	....	....	17.50	16.16	14.82	64.9
Fettlers (rough)	....	23.07	....	22.19	....	21.31	20.52	19.73	18.93	....	....	....	14.58	13.24	11.91	11
Grinders	....	21.90	....	21.02	....	20.14	19.39	18.65	17.90	....	....	....	16.56	15.10	13.85	43.4
Welders	....	21.95	....	21.14	....	20.34	19.59	18.83	18.08	....	....	....	16.65	15.22	13.85	43.4
Blacksmiths	....	20.63	....	19.81	....	18.99	18.30	17.59	16.89	....	....	....	15.55	14.21	12.88	47.2
Blacksmiths, strikers	....	10.90	....	21.45	....	20.63	19.87	19.00	18.35	....	....	....	17.01	15.67	14.34	40.5
Fitters and turners	....	18.45	....	17.63	....	16.81	16.19	15.55	14.94	....	....	....	13.61	12.27	10.94	60.7
Slotters, shapers and planers	....	10.90	....	21.45	....	20.63	19.87	19.00	18.35	....	....	....	17.01	15.67	14.33	40.5
Drillers and borers	....	21.18	....	20.36	....	19.54	18.82	18.09	17.37	....	....	....	16.04	14.70	13.37	44.7
Electricians	....	19.54	....	18.72	....	17.90	17.24	16.57	15.92	....	....	....	14.58	13.24	11.91	53.1
Electric crane drivers	....	10.90	....	21.45	....	20.63	19.87	19.10	18.35	....	....	....	17.01	15.67	14.34	40.5
Laborers	....	18.17	....	17.35	....	16.52	15.93	15.31	14.70	....	....	....	13.37	12.03	10.64	69.2



THIS CHART SHOWS HOW THE UNITED STATES HAS GAINED SKILLED LABOR THROUGH EXCESS OF IMMIGRATION OVER EMIGRATION. THE GAIN FOR THE FISCAL YEAR ENDED JUNE 30, 1922, WAS 33,630

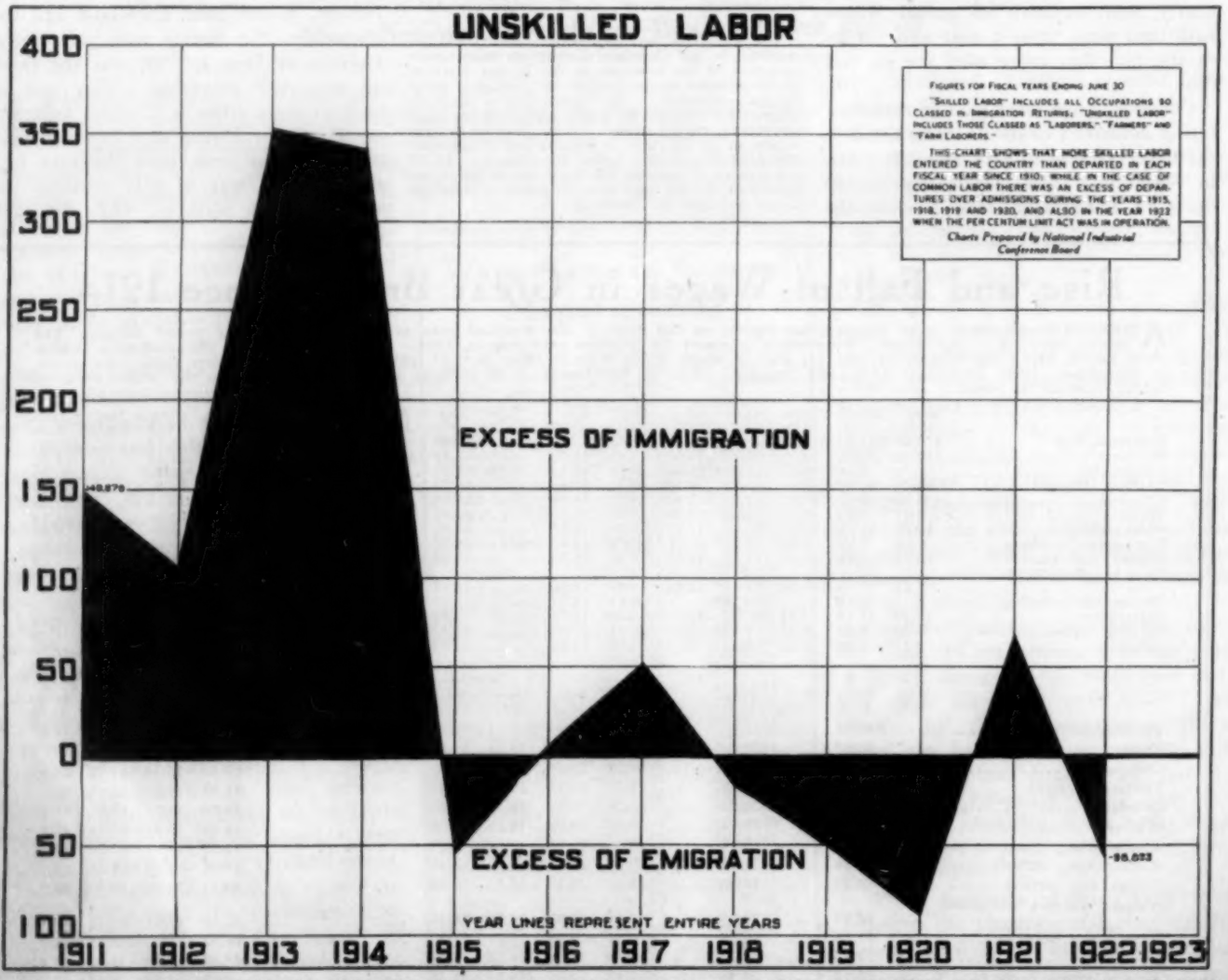
city the prewar rate was 38.8 cents an hour, or $3.50 for a 9-hour day.

In four cities, Cincinnati, Detroit, New Orleans and St. Louis, wages paid union molders are lower than a year ago. In Cincinnati $5.50 is paid for an 8-hour day, compared with $6 a year ago. In Detroit the present rate is $6 for eight hours, against $7.20 a year ago; in New Orleans, the present rate is $6 for eight hours, compared with $6.40, and in St. Louis it now is $6.50, against $6.80 a year ago.

In three other foundry centers, Chicago, New York and Pittsburgh, the present molders' rates are higher than a year ago. In Chicago the rate is $6.50 for eight hours, an advance from $6.40. In New York it now is $6.75, an increase from $6.50, and in Pittsburgh it is $6.44, against $6.25.

In general, the average of the union molders' rates in effect today in the 11 centers referred to is 93.5 per cent over the prewar rate. A year ago the average was 99.1 per cent above 1914. At the peak, in 1920, it was 135.7 per cent above 1914. The wage composite of the 11 cities today is $6.15 for an 8-hour day, compared with $6.32 a year ago.

Figures compiled by the bureau of labor statistics, department of labor, as


UNSKILLED LABOR
400
350
300
250
200
150
100
50
0
50
100
EXCESS OF IMMIGRATION
EXCESS OF EMIGRATION
YEAR LINES REPRESENT ENTIRE YEARS
1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923
FIGURES FOR FISCAL YEARS ENDING JUNE 30
"SKILLED LABOR" INCLUDES ALL OCCUPATIONS SO CLASSED IN IMMIGRATION RETURNS; "UNSKILLED LABOR" INCLUDES THOSE CLASSED AS "LABORERS," "FARMERS" AND "FARM LABORERS."
THIS CHART SHOWS THAT MORE SKILLED LABOR ENTERED THE COUNTRY THAN DEPARTED IN EACH FISCAL YEAR SINCE 1910; WHILE IN THE CASE OF COMMON LABOR THERE WAS AN EXCESS OF DEPARTURES OVER ADMISSIONS DURING THE YEARS 1915, 1918, 1919 AND 1920, AND ALSO IN THE YEAR 1922 WHEN THE PER CENTUM LIMIT ACT WAS IN OPERATION.
Charts Prepared by National Industrial Conference Board

THIS CHART SHOWS HOW THE UNITED STATES HAS LOST UNSKILLED LABOR IN RECENT YEARS THROUGH EXCESS OF EMIGRATION OVER IMMIGRATION. THE NET LOSS FOR THE FISCAL YEAR ENDED JUNE 30, 1922, WAS 56,853 UNSKILLED LABORERS

set forth in an accompanying table indicate how employment has increased in the iron and steel industry and how wages have advanced in the past year. It will be noted that in January 1922, 106 establishments reporting to the bureau employed 103,506 persons, or an average of about 972 to a plant. The average increased as shown, until in November 132 establishments reported having 185,488 employes on their payrolls, an average of about 14,075 employes per plant. The 106 establishments reported in January, 1922 that the total amount of their payroll for a half-month period was $4,055,652.00. These payrolls increased until in November 1922, 132 establishments reporting gave their combined payrolls for a half-month period as $11,036,241.

Average Monthly Wages in Iron and Steel Industry, and Number of Employes

	Number of establishments	Number of employes	Payroll for half month	Average wage per month	Average wage year previous
November, 1922....	132	185,488	$11,036,241	$118.90	$ 92.68
October	140	176,387	9,903,466	112.28	81.80
September	126	164,731	8,858,008	108.02	77.40
August	125	153,260	7,424,212	97.04	84.88
July	110	142,721	5,941,489	83.26	76.96
June	110	146,087	6,906,566	94.58	87.82
May	106	136,593	6,383,730	93.52	97.64
April	108	125,089	5,509,555	88.14	106.33
March	113	120,663	5,341,971	89.02	122.18
February	109	124,932	5,306,863	85.58	129.70
January	106	103,056	4,055,652	78.70	150.16
Averages:					
1922 (11 months)..	116	143,546	6,969,796	97.10	.....
1921	114	117,223	5,869,438	100.12	.....
1920	105	172,318	13,015,883	151.06	.....
1919	105	154,244	9,989,098	128.22	.....
1918	97	180,859	10,734,114	118.74	.....
1917	97	180,088	8,327,492	92.49	.....

The average wage per month as shown by the bureau of statistics in January, 1922 was $78.70, while 10 months later in November it was $118.90. The average wage per month for 114 establishments in 1921 was $100.12, while for the 11 months in 1922 the average was but $97.10. The latter figure is below the average for 1921 owing to the low state of wages in the earlier months of 1922. For the 11 months in 1922 up to and including November 116 establishments reported having 143,546 employes or an average of 1237 per plant. The average wage per month for the employe in the iron and steel industry in November 1921 was $92.68, whereas in November 1922 it was $118.90, or an increase of about 27 per cent.

Another comparison of wages paid in the iron and steel industry is afforded by the figures relating to the independent sheet, tin and iron mills as regulated by selling prices based on an agreement with the Amalgamated Association of Iron, Steel and Tin Workers. The average wage of the sheet mill workers on their sliding scale arrangement for the period of November and December 1922 was 37.5 per cent over the average for the year 1914. A year ago it was but 18 per cent over 1914. The average of tin mill workers in November and December, 1922 was 23 per cent over 1914, as compared with 30 per cent over 1914 one year ago. Increases are noted in the rates paid all classifications of men under the sliding scale, except for the tin mill workers. This may make it appear that the wage for tin mill workers is out of line with the others. Such, however, is not the case. There are two reasons: First is that the rate of advance was reduced by agreement during the year from 1⅛ per cent for each 5 cents advance in selling price, to 1 per cent for each 5 cents as at present, and secondly there has been no change in the price card rates for tin plate since March 1. The average price as determined by representatives of the mills and amalgamated association, on which the wage is based, has remained the same, $4.65 per base box, while sheet iron and bar mill workers have been advanced on every bi-monthly examination period since then.

Substantial advances are shown for all of the classifications of bar mill workers, the average wage in the bar mills today being 68.5 per cent over the 1914 level, as compared with 47.9 per cent over that level in 1914. When the rate was at the peak in 1920 the wage was 216.8 per cent over 1914. Puddlers are receiving under the November-December, 1922 wage determination $10.12 per ton, which is an increase of 80 per cent over the average for 1914. Further comparisons are afforded by an accompanying table.

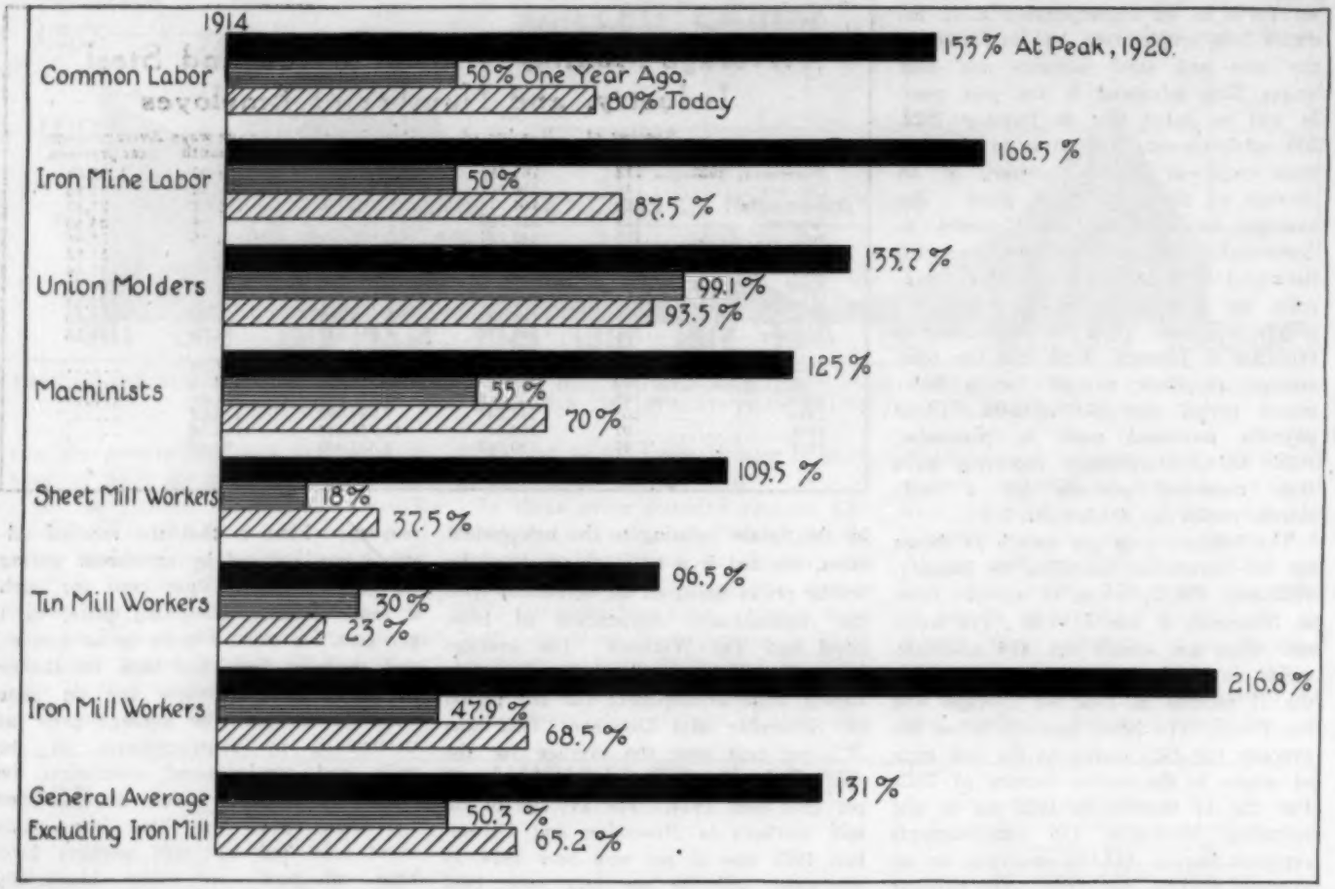
A composite of wage advances, taking into consideration the averages paid to common labor in the iron and steel industry and general metal-working plants, wages of union molders, machinists, sheet and tin mill workers, indicates that the average today is about 65 per cent above the level of 1915, as compared with 50 per cent above, one year ago. Wide fluctuations are noted in wages of certain classifications, from the common laborers now receiving 40 cents against as low as 18 to 20 cents a year ago, to the tin mill workers with a slightly lower rate today than a year ago.

The following table, prepared by the National Industrial Conference board broadly presents the movement of wages for the United States. The up-

Wages Paid to Union Molders Compared

Rate prior to war, 1914	Highest rates since 1914	Rates one year ago	Rates, Dec. 1, 1922
BOSTON:	$7.20 for 8 hours	$6.00 for 8 hours	$6.00 for 8 hours
$3.50 for 9 hours	131.9% over prewar	93.2% over prewar	93.2% over prewar
CHICAGO:	$8.40 for 8 hours	$6.40 for 8 hours	$6.50 for 8 hours
$4.00 for 9 hours	136.4% over prewar	80.1% over prewar	82.8% over prewar
CINCINNATI:	$7.00 for 8 hours	$6.00 for 8 hours	$5.50 for 8 hours
$3.50 for 9 hours	125.5% over prewar	93.2% over prewar	77.0% over prewar
DETROIT:	$8.50 for 8 hours	$7.20 for 8 hours	$6.00 for 8 hours
$3.50 for 9 hours	173.7% over prewar	131.9% over prewar	93.2% over prewar
MINNEAPOLIS:	$7.20 for 8 hours	$6.00 for 8 hours	$6.00 for 8 hours
$3.50 for 9 hours	131.9% over prewar	93.2% over prewar	93.2% over prewar
NEW ORLEANS:	$7.20 for 8 hours	$6.40 for 8 hours	$6.00 for 8 hours
$3.25 for 9 hours	149.3% over prewar	121.6% over prewar	105% over prewar
NEW YORK CITY:	$7.04 for 8 hours	$6.50 for 8 hours	$6.75 for 8 hours
$3.75 for 9 hours	111.5% over prewar	95.6% over prewar	101.9% over prewar
PITTSBURGH:	$7.50 for 8 hours	$6.25 for 8 hours	$6.44 for 8 hours
$4.00 for 9 hours	111% over prewar	75.9% over prewar	81.3% over prewar
ST. LOUIS:	$8.00 for 8 hours	$6.80 for 8 hours	$6.50 for 8 hours
$3.50 for 9 hours	157.7% over prewar	119% over prewar	109.2% over prewar
CLEVELAND:	$7.20 for 8 hours	$6.00 for 8 hours	$6.00 for 8 hours
$3.50 for 9 hours	131.9% over prewar	93.2% over prewar	93.2% over prewar
INDIANAPOLIS:	$7.20 for 8 hours	$6.00 for 8 hours	$6.00 for 8 hours
$3.50 for 9 hours	131.9% over prewar	93.2% over prewar	93.2% over prewar

The foregoing schedules are for floor, bench and core workers, with two exceptions: Coremakers in Minneapolis prior to the war received $3.15 for 9 hours, and coremakers in Indianapolis, $3.30 for 9 hours. In later comparisons they are on the same basis as floor and bench workers in their respective cities.



COMPOSITE OF WAGE ADVANCES, EXPRESSED IN PERCENTAGES OVER 1914, WHEN THE RESPECTIVE WAGES WERE AT THE PEAK IN 1920, A YEAR AGO, AND AS THEY ARE TODAY

ward trend is still maintained, although the rise is not as great as that of a few months ago.

Date	Reductions	Increases	Total changes
June 15—July 15	25	21	46
July 16—Aug. 15	7	8	15
Aug. 15—Sept. 15	4	119	123
Sept. 15—Oct. 15	4	65	69
Oct. 15—Nov. 15	1	36	37
Nov. 15—Dec. 15	1	12	13

The demand for labor caused by continued activity in industry exceeds the supply, and this is especially true of the iron and steel industry and the railroads. Cuts made in wages during the depressed period a year ago have been completely restored or in some instances are in process of restoration. The continuation of wage advances, noted in practically all industries, coupled with the fact that the industries are reporting increasing activity and employment, and in many instances, inability to obtain the desired number of workmen, leads to the conclusion that still further advances will be made in the upward trend.

The scarcity of labor in some manufacturing industries is prompting the renewal of efforts toward intensive training of the less skilled workmen to qualify for the more important tasks. Men ordinarily classed as laborers are being called on for other and higher-paid work. This is tending to reduce the number of unskilled workers.

An objection to modifying the immigration act, expressed by some congressmen, is that "there is no labor shortage in the United States at present which the payment of higher wages cannot rectify." The consensus of opinion among large employers in regard to this is that without additional immigrant labor the limit has about been reached in the marshaling of unskilled workers at wages ordinarily paid for the skilled; and without a greater supply of common labor there is no foundation on which to build.

In contrast with wage advances made during the year, bringing the general level in the country considerably above that of a year ago, the cost of living as represented by the average wage earner's family budget today is about the same as at the beginning of 1922.

In January, 1922, the composite as prepared by the National Industrial Conference board showed that the cost was 61.4 per cent over the figure of July, 1914. This composite figure dropped in March to 54.7 per cent, but in April advanced to 54.8 per cent.

It went slowly up the scale until in October the figure was 57.1 per cent above the level of 1914. At this point food was 43 per cent above the 1914 level, as compared with 50 per cent in January and shelter was 65 per cent, compared with 69 per cent. The cost of clothing had advanced from 56 per cent over 1914 to 57 per cent and fuel and light from 78 to 87 per cent. Sundries dropped from 78 per cent in January to 72 per cent in October. The composite today is around 60 per cent above 1914, substantially at the same point as a year ago.

Wage Changes Based on Selling Prices

Amalgamated Association of Iron, Steel and Tin Workers' Scale

	Percentage advance at peak over 1914	Percentage advance in Nov.-Dec., 1921 over 1914	Percentage advance in Nov.-Dec., 1922 over 1914
Sheet mill workers	109.5	18.0	37.5
Tin mill workers	96.5	30.0	23.0
Bar mill workers:			
Puddling	235.0	50.0	80.0
Cinder bottom:			
Heavy scrap	271.0	61.0	84.5
Light scrap	253.0	57.0	80.0
Cast swarth	250.0	57.0	80.0
Sand bottom:			
Heavy scrap	212.0	45.0	64.0
Light scrap	271.0	61.0	87.0
Muck rolling	227.0	50.0	72.0
Piling on boards	138.0	31.0	43.0
Heating	174.0	34.5	50.0
Guide mill	137.0	32.5	44.5
Average, bar mill	216.8	47.9	68.5

Where We Stand in World Market

American Exporters, While Doing Well in Certain Markets, Generally Are Not Making Progress—Better Organization and More Consistent Efforts Needed—How Great Britain Scores—Outlook for 1923

BY H. COLE ESTEP
European Manager, Iron Trade Review

AMERICAN mills are not securing a proportionate share of the world's export trade in iron and steel at the present time. This is because conditions growing out of the settlement of the coal and railroad strikes of last summer, coupled with the labor-dictated immigration policy of the government, have arrested the liquidation of production costs which started in 1920, whereas most European countries, and notably England, have gone ahead and finished the task of reducing expenses as far as general postwar conditions will permit. These changes have left American costs at a point where international competition has become exceedingly difficult. In fact in certain sections of the country conditions so strongly favor imports that receipts of pig iron, mainly at north Atlantic ports, were 109,171 gross tons during the first nine months of last year, compared with only 20,527 tons in the corresponding period in 1921. Imports of semifinished in the same period increased from 6114 ton in 1921 to 16,216 tons in 1922.

Under these circumstances it is not surprising to find that American exports of all iron and steel products, which were 229,616 tons in May, four months later in September had dropped to 128,370 tons. The surprise lies in the fact that the business held up as well as it did. Very likely this would not have been the case were it not for the consistently sustained export policy of the United States Steel Corp. For years this great organization, functioning through the United States Steel Products Co., has pursued an unvarying policy with reference to overseas trade, setting aside definite tonnages, establishing permanent connections, and holding its share of the market, generally speaking, in spite of any conditions which might obtain at home or abroad. The results naturally have been generally successful, especially since the Products company is one of the few complete merchandising concerns in America, with strong banking connections, its own shipping facilities, and well grounded agencies. When sending American steel to the Far East it is able to bring back rice, or other products for the home market, thus completing the circle of trade. Some of the other concerns which have followed similar policies have done so only spasmodically rather than consistently.

Strong as are the connections of the Steel Products company both in the United States and in foreign countries, it can scarcely be expected to carry the burden of American overseas trade in ferrous commodities by itself. Not a few of the troubles of our export trade are internal. It suffers tremendously from the tendency of so many producers to forget all about it during periods of lively domestic demand.

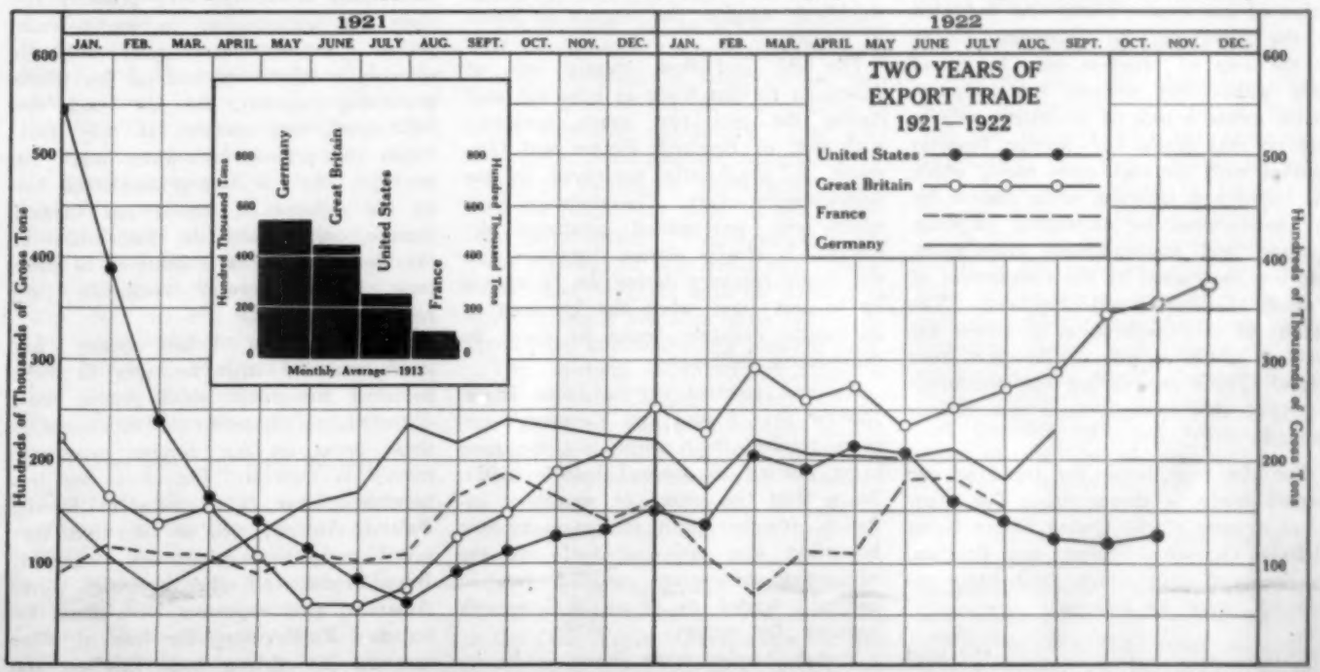
To be sure, with the home market on galvanized sheets, for instance, standing at 4.35c, Pittsburgh, and European makers willing to sell the Burmese planters

Table I

Two Years of Trade

	1922 Estimated	1921
EXPORTS—GROSS TONS		
Scrap Eliminated		
Great Britain	3,287,400	1,700,400
Germany	2,343,500	2,110,000
United States	1,975,000	2,217,777
France	1,770,600	1,529,900
Belgium*	1,311,900	903,600
Total	10,688,400	8,461,677
IMPORTS—GROSS TONS		
Great Britain	865,000	1,646,000
Germany	1,750,000	621,400
United States	360,000	83,900
France	650,000	434,800
Belgium*	475,000	514,200
Total	4,100,000	3,300,300

*Includes Luxemburg in second half of 1922.



MONTHLY COMPARISON OF IRON AND STEEL EXPORTS OF UNITED STATES, GREAT BRITAIN, GERMANY AND FRANCE DURING THE PAST TWO YEARS—SCRAP ELIMINATED

at 3.50c, f.o.b., there is little commercial incentive to go after foreign business. But not so long ago the situation as to prices was reversed, and the exporter must be willing to take the bitter with the sweet, not forgetting the effect of tonnage on overhead in the steel business. What America needs are consistent, tenacious exporters who stay in the ring during the bad rounds as well as the good ones, it being generally conceded that with total capacity of about fifty-six million tons of ingots a year, and continual new construction, a substantial foreign business is necessary for complete prosperity.

The fact that the American iron and steel business, in spite of the great reversal of form it exhibited last year, is not yet earning fully satisfactory profits, is due in part to the sick condition of our export trade. As indicated in the foregoing, the stumbling blocks in the way of progress may be found both within and without the industry. Inside exists a lack of consistent policies and no real desire for foreign business coupled with the high costs under which the industry is laboring, while outside we are handicapped by incomplete shipping, banking, and merchandising connections, and are confronted by the competition of France, Germany and England. The results of this combination of forces are written in the records of the past three years. These records are not discouraging, but they contain food for serious thought.

For the time being the trend in our export trade is disquieting. The combined exports of the United States, Great Britain, Germany, France, and Belgium, in the past three years, 1922 being estimated, were as follows:

Year	Tons
1920	11,753,800
1921	8,461,677
1922	10,688,400

Of this total, the United States secured 42 per cent in 1920; 25 per cent in 1921; and 18 per cent in 1922. Great Britain, on the other hand secured 27 per cent in 1920 and 30 per cent last year. She got this largely at the expense of the United States, since Germany's share last year was greater than it was two years ago. This is one of the reasons why the statement is made that the chief foreign competitor of the American iron and steel industry is Great Britain, rather than Germany. In some American business circles the latter country has been greatly overrated, while on the other hand the guileless propaganda of our British friends, who seldom put their best side forward, has been absorbed without reflection. With her low wages, her stable currency, her great overseas banking system, her thousands of active ships, and worldwide empire, the country to watch is Britain.

The ebb and flow, mostly ebb, of American foreign trade in iron and steel during the past two years, compared with that of England, France and Germany, is graphically portrayed in the accompanying chart. The eminence from which our war-inflated commerce descended is clearly shown, together with the steady recovery during the 12 months up to last June, when the handicap of incomplete deflation began to exert its depreciating influence.

As was foretold in the IRON TRADE REVIEW over a year ago, Germany's exports reached their zenith, for the time being, during the second half of 1921. Since then the effect of monetary inflation, together with the necessity for importing iron ore and fuel and the exhaustion of scrap supplies, has in general tended to restrict Germany's capacity for export.

French foreign trade shows in its irregular nature the effect of coping with both physical and financial obstacles. Nevertheless French exports are much larger than they were in antebellum days and have steadily increased since the end of the war, the total for last year being 1,770,600 tons compared with 895,000 tons in 1920. Postwar France has it within her power to become a serious rival to Germany, but hardly to dislodge Great Britain. Her exports at present are greater than those of the United States, but the effect of French and Belgian competition on American foreign trade is chiefly indirect. The markets of these three countries do not overlap to any great extent.

Britain's Exports Lead

Although her production still leaves much to be desired, Great Britain has clearly re-established herself as the world's premier exporter of iron and steel. As shown on the chart, her foreign trade has steadily increased since the end of the great coal strike in 1921. In October last year the shipments were over five times what they were in July 1921. British exports overtook those of the United States in August 1921; France was distanced in November; and Germany in December. During all of 1922 a strong lead was held consistently and increased during the closing months. At present British exports are running nearly double those of the United States and Germany combined. The detailed figures for last year are shown in Table II.

The consolidated results for the past two years are given in Table I, which also shows the imports of the five principal countries. As this table indicates, international trade in general increased about 25 per cent last year compared with 1921, which will very probably remain the leanest year in the postwar period. Business last year, although showing a substantial and on the whole gratifying recovery, did not reach the 1920 level, and remains at only two-thirds the prewar high-water mark set in 1913. This is largely accounted for by the collapse of Russia and Central Europe, coupled with the disturbances in the Near East, so it is likely to be some time before normal conditions are restored.

Fortunately the United States has never exported large tonnages to those parts of the world which remain most disturbed, so the effect of conditions in these areas on our foreign commerce mostly is indirect. But it is no less tangible. Loss of markets in Russia, Poland, Austria, etc., in turn has curtailed purchasing power in Argentine, Brazil, India, and other countries where American steel exporters have direct interests. Furthermore the loss of these markets has driven both England and Germany into sharper competition with us in South America and the Far East.

Table II

Iron and Steel Exports in 1922

Reduced to Gross Tons in All Cases, with Scrap Eliminated—Second Half Partly Estimated

Month	United States	United Kingdom	Germany	France	Belgium
January	157,600	253,100	218,200	164,000	
February	133,200	223,400	170,000	107,000	198,400
March	204,800	295,800	208,700	71,300	
April	190,100	258,400	195,500	125,800	83,900
May	218,500	272,400	204,500	122,200	
June	211,400	236,300	209,100	180,300	279,600 (b)
Total, first half	1,115,600	1,539,400	1,206,000	770,600	561,900
July	155,400	251,700	206,200	182,100	
August	142,000	270,000	181,300	168,400	
September	128,400	279,200			750,000*(b)
October	131,500	347,100	750,000*	649,500*	
November-December	260,000	600,000*			
Total, second half	817,300*	1,748,000*	1,137,500*	1,000,000*	750,000*
Total for 1922	1,931,900*	3,287,400*	2,343,500*	1,770,600*	1,311,900*

(b) Belgium and Luxemburg trade combined, consequent on the economic union between these two countries. *Estimated figure. Figures, except those estimated, compiled by M. S. Birkett, statistical officer, National Federation of Iron and Steel Manufacturers, London.

International trade is a fabric, not a series of isolated strands. Rend it in one place and you disturb the whole. Whether this truth is thoroughly understood yet by American business remains to be seen.

Turning again to Table I, it will be observed that Great Britain practically doubled her exports last year compared with 1921, and that France, Germany and Belgium also registered gains, although on a much smaller scale. The business of the United States on the other hand shows a substantial loss, although general conditions were much more favorable to business last year than in 1921.

The combined imports of the five principal countries were 4,100,000 tons in 1922 compared with 3,300,300 in the previous year, thus reflecting from the other side the general improvement in international trade. The import figures also emphasize the growing strength of the British position and the decline of Germany, from the standpoint of plant operations, since British imports in the year just closed were only one-half those in 1921, while German imports nearly tripled. During the latter part of last year Germany was importing steel at the highest rate in her history and at over seven times the prewar price. In these figures are mirrored both reckless finance and lack of essential raw materials. Thorny as are both of these problems to Germany, they are not as hopeless as might be thought. On the one hand lies the stabilization of the mark and on the other question of getting more ore from Lorraine.

Insofar as the relative world importance of American foreign trade is concerned, the figures given in Tables I and II, and illustrated by the chart, should be viewed in light of the fact that an appreciable amount of the tonnage which goes to swell the export figures of France, Belgium, Germany, and to a considerable although lesser extent, England, is in reality local business. France sells to Germany, from whom Britain in turn buys, only to sell again to Belgium. This intra-European trade is considerable, but it is hardly any more "foreign" than the transactions between Ohio, Pennsylvania, and Indiana.

Where the U. S. Gets Business

Therefore to show the nature of European competition with our own bona fide export trade, Table III has been prepared. It presents the exports of England, Germany and the United States for the first half of 1922 analyzed according to destinations. Since it was prepared from monthly returns with certain figures estimated where necessary to show comparative totals, the tonnages are only approximate, but are believed to be sufficiently accurate for the purpose.

The preponderance of American trade with Japan and its strength in South America, both natural markets for the United States, is gratifying. On the other hand the showing in the Antipodes and in southeastern Asia is anything but satisfactory. As far as geographical and other general considerations are concerned, the American position ought to be as good in the Indian ocean and Australasia as in Japan or South America. These countries are financially as able to deal with the United States as the others. But what American trade is up against is lack of shipping and other connections, and the entrenched position of the British empire. That the latter is in many ways an economic unit soon becomes evident in any study of foreign trade.

On account of its great population and development, American exports to Europe should be larger than they are, in spite of the close proximity of other powerful producers. But over our trade with Europe hangs the incubus of exhausted purchasing power and the huge war debt to the American government. Unquestionably the twin problem of war debts and reparations must be dealt with on something approaching a business basis before international commerce can recover fully.

The postwar financial situation is depriving the United States of its fair share of European trade, at the same time forcing the steelmakers of Great Britain, France and Germany into fiercer competition in South America and Asia and even into the American market itself.

In this struggle the British producers appear to be the best equipped in the Old World. In addition to factors already enumerated, England has carried deflation to its logical conclusion. She stands alone among the nations in this respect. The price of, and what is more the cost of producing, her coal is less than half of what it was. In the middle of November her blast furnace coke stood at $4.90 at the ovens compared with $7 to $8 in the United States. Her cargo rates are about half what they were a year or so ago. Hence England's carrying charges to the ends of the earth have been drastically reduced. Wages have been cut and up to date kept down. In August 1921, the average weekly earnings of British iron and steel workers were 75 shillings, or $16.80; a year later they were 56 shillings, or $12.54. In the same period corresponding American earnings advanced from $18 to $21 a week. In foreign trade this handicap is considerable. Only the superior productivity of the American workman and the excellent mechanical equipment with which he is provided partially saves the situation.

Table III

First Half 1922 Exports Analyzed

Exported to	Exported from United States Gross tons	Great Britain Gross tons	Germany Metric tons
Belgium		60,600	50,500
France		72,000	.....
Germany	12,000	45,600	.....
Italy		55,200	.....
Holland		22,200	239,900
Scandinavia		10,200	55,200
Australasia	13,500	152,400	.....
India and Southeast Asia	21,600	338,400	117,600
South Africa	.....	47,400	.....
South and Central America	149,600	67,200	93,800
Japan	380,000	60,000	58,800
United States	.....	49,800	.....
Great Britain	25,700	.....	70,100
Canada	215,000	36,000	.....

Specializing in Export Trade

Add to this the elaborate foreign trade organization of Great Britain and the reasons why the competitive possibilities of the United Kingdom have been emphasized in this survey become evident. In the United States production is highly specialized. The result is the production of articles of high quality on a quantity basis at a unit cost which gives American manufacturers their opportunity in the markets of the world. Except possibly in the textile field, England's production facilities will not compare with those of the United States, and this is perhaps especially true in the iron and steel industry.

But just as America has specialized on production, so has the United Kingdom specialized on worldwide distribution. In this, rather than in production, lies the great advantage of the North Sea islanders. Always in surveying world competition, Bri-

(*Concluded on Page* 54)

Bethlehem Steel Corp.'s invasion of the Lake Superior district brings it into contact with iron ore property of the United States Steel Corp.

Normal Ore Trade in Prospect

Higher Operating Costs in Lake Superior District Lead Producers To Forecast Advance in Price—Bethlehem's Expansion Significant—Operations Increasing—A Review of Range Developments

BY A. J. HAIN

A SUBSTANTIAL increase in the shipments of iron ore from the Lake Superior district, and some advance in the price of the ore, is indicated for 1923. The raising of wages at the mines in recent months, lessened efficiency due to a perceptible scarcity of labor, and the high cost of coal purchased for use this winter are factors which will have an important bearing on prices.

Production costs in general are estimated by representative interests to be 25 per cent above the average for 1922. Repeated efforts of the mining companies to obtain a reduction in freight rates in the upper lakes territory have been unavailing, though their suit still is pending before the interstate commerce commission. The report of the commission's examiner is adverse to them, except for a recommendation for the cancellation of rate increases made by the Michigan railroads subsequent to the time the companies began the suit. The commission's final determination, expected at an early date, also will have an influence on prices.

The standard wage now paid in Minnesota for surface labor at the mines is 37½ cents an hour, this representing an increase of 15 per cent dating from September. At the peak in 1920 the wage was 48½ cents. Today the standard wage for common labor underground is 48 cents, compared with 42 cents prior to the advance, and with 69 cents in 1920. Contract miners are paid 65 cents, while previously they were paid 56½ cents. In 1920 they received 92 cents. In that year laborers and miners were paid on a basis of "time and one-half" for overtime, this practice having since been abolished.

A slight deviation from these figures is to be noted in Michigan, where some underground labor is paid more, and surface labor less, than on the Mesabi range in Minnesota. Rates paid by individual companies show variations, due to location. As high as 40 cents is paid for surface labor, 50 cents for underground labor, and 66 cents for contract work.

Mining operations this winter are being conducted on a more extensive scale than at any similar period since the end of the war. In underground mining the labor cost represents about 70 per cent of the total expense of production.

The available labor is fully employed, and in certain localities a shortage exists, so that while wages have advanced, operators claim the output per man has decreased, this resulting in a substantial addition to the labor cost. A large share of the workers is recruited from immigrants, and the effect of the 3 per cent limitation act is discernible. In the dull period of 1920 and 1921 many laborers and miners drifted away, and they have not been replaced. Certain large companies are arranging their schedules with a view to holding their organizations. This accounts for a continuation of extensive stripping operations throughout the winter, under unfavorable conditions.

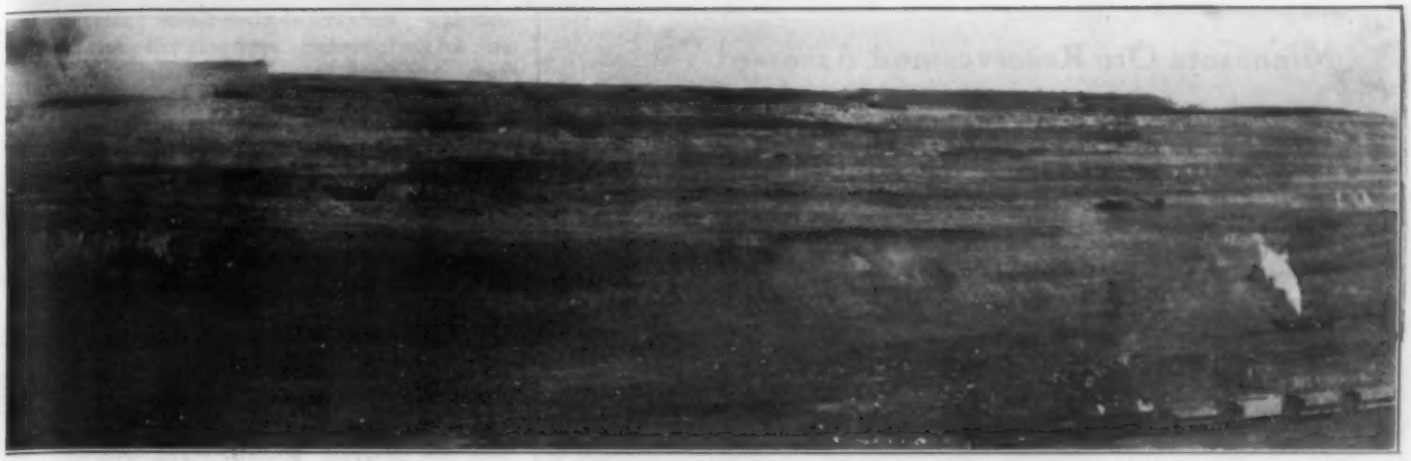
Independent mine operators have paid as high as $10 and $11 a ton for their coal supplies. These prices have been paid for the fuel delivered at the mines, whereas in recent years the price has been $5, and before the war, $3.50. Some mining companies are not crowding winter operations as they do not wish to be caught with a surplus of ore in stockpile in the event of another coal or railroad strike.

Comparisons show that on the average in the last 15 years the price of standard Mesabi nonbessemer ore, as determined when buying began, was 20.5 per cent of the price of basic pig iron then prevailing in the valley. In 1908 the percentage was 22.5. In each succeeding year up to April 1, 1918, the ore price was one-fifth or more of the price of the iron, with two ex-

Approximate Shipments by Ranges

	Gross Tons 1922	1921
*Mesabi	27,793,780	16,350,696
*Vermilion	1,146,669	869,313
*Cuyuna	1,290,954	488,562
Total Minnesota	30,231,403	17,708,571
*Gogebic	5,816,940	2,336,493
*Marquette	2,511,432	1,116,468
*Menominee	4,053,409	1,584,404
Mayville, etc.	100,000	52,413
Misc. shipments by rail	900,000	†
Grand total	43,613,184	22,798,349

*Includes lake shipments only in 1922.
†Absorbed in range figures for 1921.



Bethlehem has half interest in Mahoning mine, adjacent to Hull-Rust. Roughly, upper half of photograph shows the Mahoning, lower half, Hull-Rust

ceptions. One of these was in 1911 when the percentage dropped to 18.1, and the other in 1916, when it was 19.7.

When the government fixed prices, effective April 1, 1918, Mesabi nonbessemer ore was 15.7 per cent of the price of basic iron. On July 1, 1918, when the ore price was raised, the percentage became 17.1, and on Oct. 1918, 17.4. The following spring, 1919, when the government had relinquished control, the relationship was restored, at 21.5 per cent. In the spring of 1920 when basic iron was up to $40, the ore price was set at $6.55, or only 16.3 per cent. This was offset to some extent in 1920 when ore was 25.8 per cent of the price of the iron, this being the highest percentage recorded in 15 years. Last year the proportion was 20.2 per cent.

Prices of iron ore and pig iron are to some extent interdependent. Certain factors effect them alike. The market for pig iron and its price are considered, as well as cost of mining and transportation, when ore is quoted. If basic iron is around $28 in the spring, and if the average relationship of 20.5 per cent is applied, then Mesabi nonbessemer would be $5.60, representing an advance of 55 cents a ton. These are some of the points pertaining to the outlook for ore prices; though the only development to date of a definite character is the increase in mining costs.

The volume of new ore business this year is likely to show considerable improvement over that of 1922. Estimates of shipments to be made range from 50,000,000 to 55,000,000 tons. In 1922 the total of shipments was approximately 43,600,000 tons; 42,613,184 tons being shipped in vessels, and approximately 1,000,000 tons all-rail. Details concerning ranges, ports and routes are given in accompanying tables. Interferences due to the coal and railroad shopmen's strike are reflected in the final returns. A year ago operators estimated the requirements around 46,000,000 tons, and if the strikes had not occurred they say this figure would have been equalled, if not exceeded. Shipments in 1922 exceeded those of 1921 by about 95 per cent. In 1921 the total was 22,798,349; in 1920, 60,411,572, while the largest tonnage ever forwarded from the Lake Superior district was 66,658,466, in 1916. The Steel corporation's shipments in 1922 totaled 19,438,178 tons, compared with 14,056,759 in 1921.

One of the leading producers is proceeding on the assumption that shipments in 1923 will be about 55,000,000 tons. It bases this on requirements for blast furnace operations in 1923 and in the first quarter of 1924 averaging 85 per cent of the actual maximum. It considers the actual maximum output to be 3,482,000 tons a month, as in Oct. 1918, when 370 furnaces were in operation out of a total of 435 in the country. Allowance is made for ore now on hand at furnaces and lower lake docks; for 15 per cent of the total ore requirements being supplied from other than the Lake Superior district, for 3 per cent of the total iron output accounted for with scrap, and for a normal surplus of ore on hand at the end of the period.

Ore Shipments by Ports and Railroads

	Gross Tons 1921	1922
C. & N. W., Escanaba	1,111,661	3,053,866
C. M. & St. P., Escanaba	694,995	1,538,488
D. S. S. & A., Marquette	198,742	364,840
L. S. & I., Marquette	588,204	1,611,380
C. & N. W., Ashland.	2,008,111	4,659,315
Soo Line, Ashland....	256,594	1,153,892
G. N., Superior.....	4,507,160	9,943,241
Soo Line, Superior...	325,790	920,276
N. P., Superior.....	158,328	370,678
D. M. & N., Duluth..	9,164,803	13,044,771
D. & I. R., Two Harbors	3,286,338	5,952,437
Totals, by water route	22,300,726	42,613,184

The chief development of general interest is the Bethlehem Steel Corp.'s sudden appearance as one of the most important factors in the Lake Superior district, through its recent acquisition of the Midvale Steel & Ordnance Co. and Lackawanna Steel Co. Previously it held one-seventh of the Scranton mine, Mesabi range, and one-seventh of the Plymouth, Gogebic range its shares in these combined representing 5,000,000 tons of ore. Now it has increased its interest in these properties and has purchased into 19 others, on five ranges, the total of its holdings in the district being at least 180,000,000 tons.

Through the Lackawanna company, Bethlehem acquired interests in the following mines: Gogebic range—Windsor, Cary, Mikado, Brotherton, Sunday Lake and Plymouth; Menominee range—Baltic, Bengal, Caspian and Fogarty; Mesabi range—Elba, Minorca, Yawkey and Corsica; Marquette range—Negaunee. In purchasing the Midvale company it obtained a share in the following mines: Mesabi range—Mahoning, Bennett, Scranton and the Mesabi Iron Co.'s mine and plant at Babbitt, Minn.; Gogebic range—Plymouth; Vermillion range—Zenith; Menominee range—Penn.

Its shares in some of the foregoing mines are identified extensively with those of Pickands, Mather & Co., and the Hanna Ore Mining Co. It now owns one-half interest in the Negaunee mine, Marquette range, the half representing 10,000,000 tons of ore, and the other half being held by the Cleveland-Cliffs Iron Co.

From the Midvale company it acquired a half interest in the Mahoning mine at Hibbing, one of the largest open pits in the Lake Superior district. Its share is equivalent to 35,000,000 tons of ore. A feature is that the Mahoning mine and the Hull-Rust, owned by the United States Steel Corp., are adjacent, being practically

Minnesota Ore Reserves and Assessed Values

Ore in Ground

County	Tons May 1, 1921	Assessed value May 1, 1921	Tons May 1, 1922	Assessed value May 1, 1922
St. Louis	1,133,142,819	$255,095,622	1,115,798,744	$250,068,788
Itasca	142,758,175	17,979,573	141,252,860	17,460,099
Crow Wing	24,753,323	3,255,423	29,222,269	3,030,509
Lake	50,978	44,410	50,978	.....
Totals	1,300,705,295	$276,375,028	1,286,324,851	$270,559,396

Ore in Stock Piles

St. Louis	9,936,975	$ 7,386,550	9,687,949	$ 6,770,767
Itasca	438,169	469,794	431,443	305,106
Crow Wing	327,267	249,585	262,890	181,570
Lake	3,073	4,468	3,574	3,199
Totals	10,705,484	$ 8,110,397	10,385,856	$ 7,260,642

Total Merchantable Ore in Ground and Stock Piles

St. Louis	1,143,079,794	$262,482,172	1,125,486,693	$256,839,555
Itasca	143,196,344	18,449,367	141,684,303	17,765,205
Crow Wing	25,080,590	3,505,008	29,485,159	3,212,079
Lake	54,051	48,878	54,552	3,199
Totals	1,311,410,779	$284,485,425	1,296,710,707	$277,820,038

The assessments as given in this table do not include the assessments for surface values, structures or improvements.

one mine—the greatest open pit mine in the world. The dividing line runs through the pit. Physically and financially Bethlehem has taken an important position among the dominating figures of the ranges.

The building of the sintering plant at Babbitt, Minn., by the Mesabi Iron Co., is the greatest single mining project underway in the Lake Superior district, and Bethlehem's interest in this, acquired from Midvale, is 25 per cent or more. In the properties just listed the Bethlehem has 85,000,000 tons or more of ore of good grade, available for use. Its potential resources represented by its interest in the Mesabi Iron Co., are more than 100,000,000 tons of a high grade product.

The success of the first unit of the sintering plant has been brought close to fulfillment through the progress made by the engineers in charge during the past year, though the plant still is in the "tuning" stage. Some shipments of Mesabi sinter were made in 1922; production is going on through the winter. The product being moisture free does not freeze, as does raw ore. Another sintering machine is to be added to bring the plant up to its full rating of 1000 tons of concentrated ore in 24 hours.

A normal year's business is in prospect in the Lake Superior iron ore mining district, and operators are prepared for it. Constructive work is being done on a larger scale than in several years; some mines long idle are being re-opened. Stripping is being done in several localities; new shafts are being sunk. More exploring for ore is noted. Greater interest is shown in equipment.

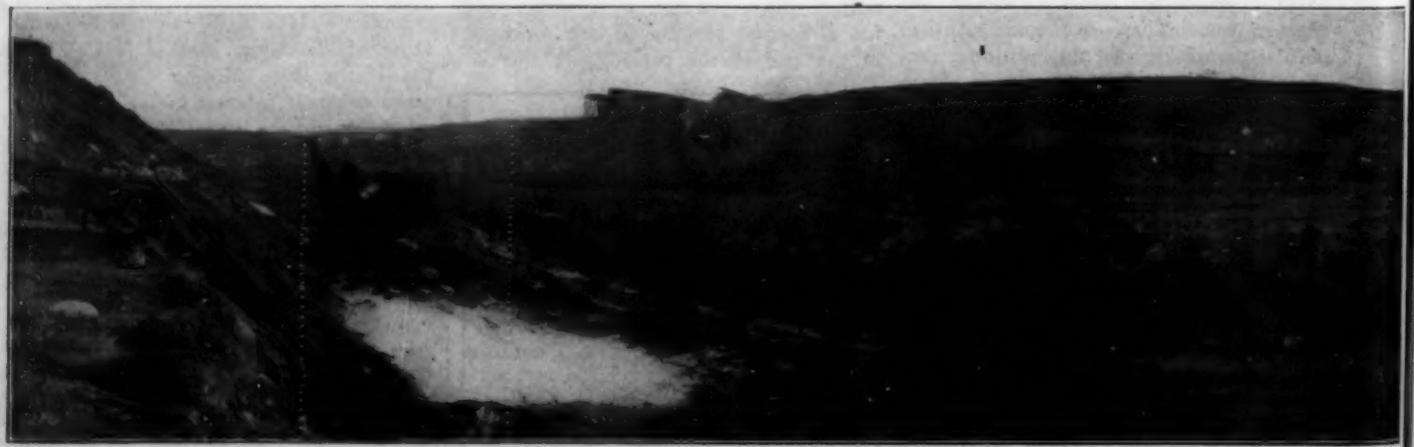
New Construction Under Way

The Oliver Iron Mining Co., will build a combined screening and crushing plant in the Virginia district. This plant will handle ore from the Missabe Mountain open pit which contains considerable lump ore, and ore mixed with rock, which it is necessary to screen. The ore will be delivered to the plant in side-dump stripping cars or in ordinary railway bottom-dump cars, on a steel viaduct approach, 86 feet high, and will be dumped into two receiving bins having a combined capacity to hold an entire trainload. The plant will have a capacity to treat 1800 tons of crude ore an hour, based on an estimate of 25 per cent of the crude ore as delivered being lump ore requiring crushing.

The ore will be drawn from each of the receiving bins by a pan conveyor 96 inches wide and delivered on to stationary grizzlies spaced 5 inches, clear opening. The throughs from the grizzlies will pass directly into the shipping pockets. The oversizes will be delivered onto a second set of pan conveyors which will feed into two 48 x 60-inch jaw crushers, if the oversizes are ore, and the product from the crushers will be delivered into the same shipping pockets as the throughs from the stationary grizzlies. If the oversizes contain rock, deflecting chutes will be lowered to catch the product from the second set of pan conveyors and it will thus be by-passed over the crushers into rock cars to be hauled away to the dump. This method of crushing and screening is expected to come into more general use for "cleaning up" certain open pit mines.

A drainage well will be sunk in the Missabe Mountain pit. This will have a casing 18 inches in diameter, and the portion through the ore body will have a perforated screen. The well will be 325 feet deep. A vertical centrifugal pump with a capacity of 1000 gallons per minute will be installed; and a vertical centrifugal pump of 1000 gallons capacity also will be installed in the Norman mine, adjacent to the Missabe Mountain. It is expected to drain the Missabe Mountain open-pit workings through the well, and also by pumping through the Norman shaft.

The Oliver company has started to



The new Boeing mine, Mesabi-Cliffs Iron Co., shipped 250,000 tons as its initial installment in 1922, stripping still being continued

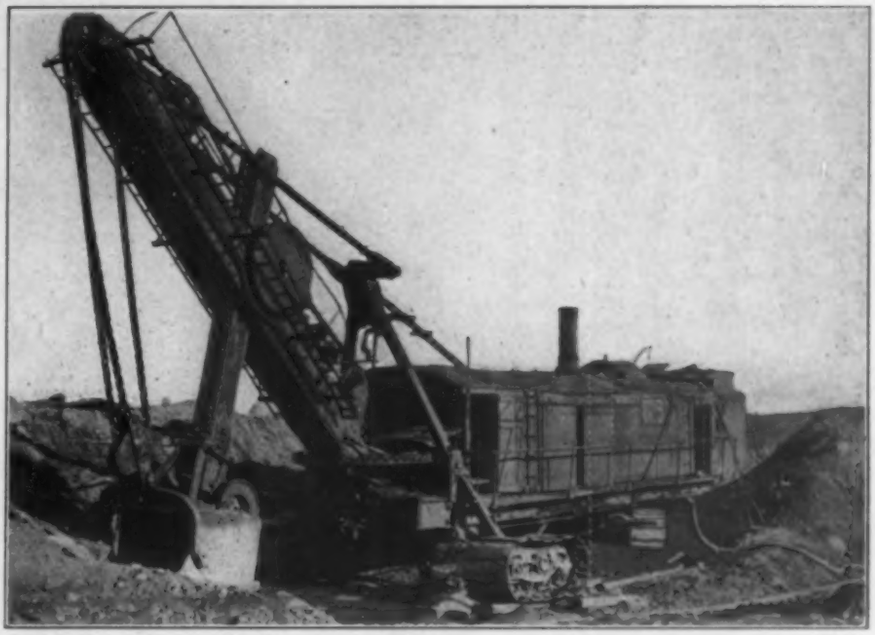
sink a vertical mine shaft with six compartments, of structural steel and concrete lath, at the Geneva mine near Ironwood, Mich. The shaft ultimately will be sunk to a depth of 4000 feet, the greatest depth of any iron ore mine in the Lake Superior district. The first 1000 feet of the shaft will be sunk with a temporary sinking equipment, and the permanent hoist will be installed when the shaft reaches a depth of 1000 feet. The permanent hoist will then be used for sinking the shaft to the main working level 2600 feet below the surface.

To provide against any possibility of slipping of any material adjacent to this shaft, it was decided to sink the shaft entirely in granite which is behind the footwall. A considerable length of drift will be required to enter the ore body.

The shaft will have an outside dimension of 11 x 25 feet and there will be two compartments for skips, two for cages, one for ladderway and one for pipes and cables. The surface equipment will consist of a structural steel headframe and structural steel idler stands. To obtain a suitable surface layout for shipping tracks for the stockpile grounds there will be provided six structural steel ore pockets, located approximately 200 feet from the shaft, and this will be part of a permanent double-track stockpile trestle located at right angles to the shipping tracks. This will permit the handling of six grades of ore on five railway tracks.

The skip and cage hoists and air compressor will be electric-driven. Power will be supplied from the "G" Pabst station over a double circuit steel transmission line. Additional power plant equipment will be installed in the "G" Pabst station and will consist of a 400-kilowatt turbo-generator operating at 200 pounds steam pressure.

A new departure in mining equipment pertains to the development of the caterpillar shovel, the field of usefulness which lies chiefly in reducing the number of men required for operating a standard shovel. A 100-ton railroad type steam shovel at the Hull-Rust pit, Hibbing, Minn., has been installed on a crawling tractor equipment built by the Bucyrus Co., South Milwaukee, Wis. This device differs from that described in IRON TRADE REVIEW a year ago in certain important respects. Instead of having two sets of caterpillars for propelling and steering, the new shovel has two forward caterpillars for propelling, while the rear end of the shovel is carried on a single trailing crawler, not propelled, but by means of which steering is accomplished through a tiller. Some steering effect may also be obtained with the forward caterpillars by stopping one and propelling the other. This device has been in operation at the Hull-Rust pit for several weeks, and has so far met the expectations of the operators.



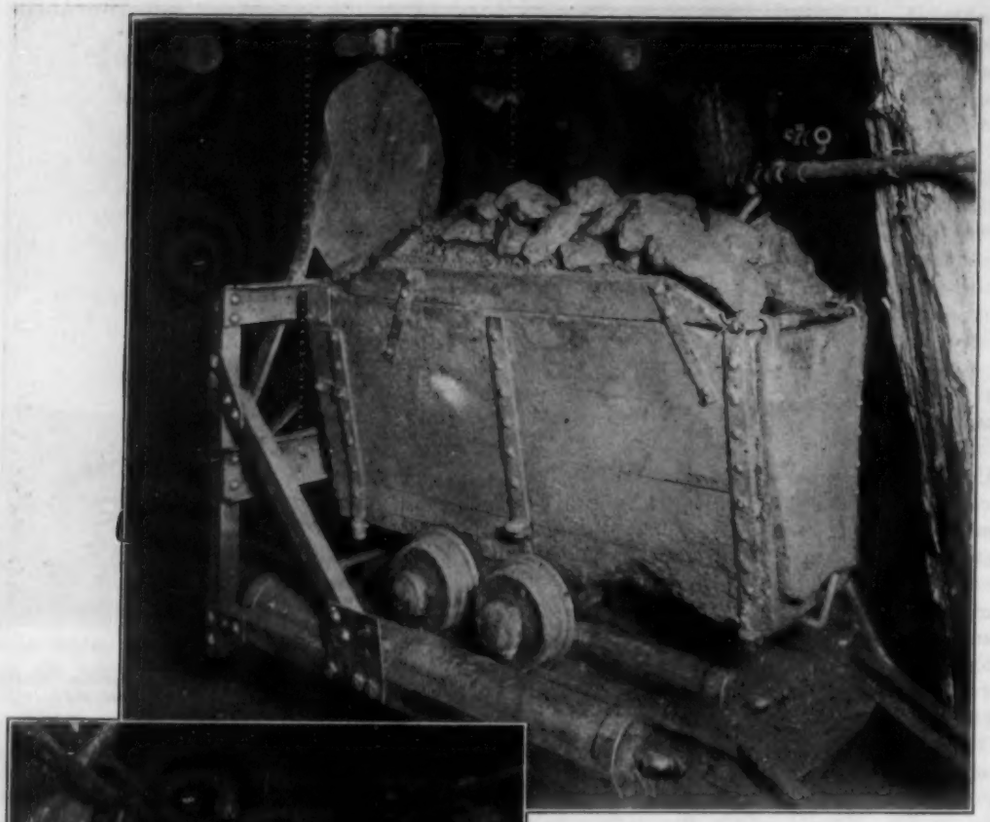
"THREE-LEGGED" CATERPILLAR ORE-MINING SHOVEL

In use at the Hull-Rust pit, United States Steel Corp., this shovel has three caterpillars, instead of four. The rear end of the shovel is carried on a single "crawler," equipped with a tiller for steering

In collaboration with engineers of the Oliver company, the Marion Steam Shovel Co., Marion, O., has brought out a new 300-ton revolving-type steam shovel, now in use at the Fraser mine at Chisholm, Minn. This shovel is a radical departure in some of its features from the customary 300-ton shovels, and is known as the Mesabi type to distinguish it from others of the same class which were originally developed for use in the strip mines of coal fields.

Heavier trussing is a feature of the new shovel. The length of the revolving frame has been shortened several feet, and the power plant has been re-designed. The size of the engine has not been increased, but the

The Boeing is 135 feet deep, and occupies 80 acres. About 5,000,000 cubic yards of overburden have been removed to date



SOMETHING NEW IN UNDERGROUND LOADERS
As developed on the Marquette range, a turntable is used at the face, the turntable being equipped with a scoop, operated with pistons. The dump car is brought up on the turntable, and is loaded by overhead motion of the scoop

capacity of the steamer boiler has been enlarged 35 per cent. The boiler is located on one side of the revolving frame instead of the center, and on the opposite side there is a 20-ton steel coal bunker designed to feed coal by gravity to the stoker. A jib crane has been provided having a capacity for hoisting 10,000 pounds of coal and placing it in the bunker.

Within the frame of the shovel housing are two crane rails carrying a hand crane with access to any part of the machinery within the housing. The location of the jib crane is such that repair parts can be lifted from the ground and placed beneath the main crane. The shovel is equipped with a 7-yard manganese steel dipper. It is believed that the unit repair cost per yard of material handled will be greatly reduced. No enlargement in mining equipment generally is noted, but efforts are being made to increase the size of ore cars, and to use heavier locomotives. The Great Northern railroad put in service a number of 75-ton cars a year ago, but 50-ton cars still are in general use. Experiments now are being made with 90 to 100-ton cars on the Duluth, Missabe & Northern railroad. The wheel base of the new cars is 19 feet, the same as that of the 50-ton cars, this being governed by the unloading equipment at the ore pockets.

The Steel corporation's mining subsidiary is contemplating the purchase of additional locomotives to meet its production requirements. The locomotives will be of the 0-8-0 switching type and will be heavier than any similar equipment on the Mesabi range now used exclusively for mining. They will have 23 x 28-inch cylinders, 50-inch drivers, 15-feet wheel base, and will operate under a steam pressure of 185 pounds per square inch. They will be superheated, hand-fired and will have arch tubes, power-gate shakers, air-operated firing doors and cast-steel gravity-dump ash pans. A conspicuous feature will be the size of the firebox, 71¼ inches wide and 108 inches long, giving a grate area of 54 square feet. The purpose of this unusual ratio of grate surface to heating surface found in this design is to enable the locomotives to burn a high percentage of screenings. Not larger, but more labor-saving equipment of the customary type is being installed in the mines of the Lake Superior district. On the Marquette range there is an interesting development in the difficult problem of underground loading. A loader tried out in the mines of the Cleveland-Cliffs Iron Co., gives promise of unusual importance. This is the invention of John Mayne, a miner of Negaunee, Mich., developed by engineers of the Cleveland-Cliffs company. The accompanying illustrations show its general appearance.

A distinguishing feature of the loader is a turntable, the lower plates of which rest on two rails. The upper surface of the table also has a pair of rails, and on these the dump car is brought up into position. Attached to the turntable is an arm, with an ore scoop 2 feet 3 inches, by 2 feet 9 inches. The table can be turned in any desired position to facilitate loading. It is equipped with two 5-inch cylinders for hoisting the scoop, the ore being deposited in the car by an overhead motion, and with two 6-inch cylinders for crowding. Chains are used to keep the turntable from slipping away from the face when the scoop is in action.

The loader is made for use with 1-ton dump cars, and can be constructed to be taken apart readily for removal to any sub-level. It is claimed that tests show a great increase in tonnage output per man employed, and a consequent increase in the wages of the miners. Its possibilities in coal mining are being considered.

Oglebay, Norton & Co., continue to extend their operations on the Gogebic range, and are considering a second large housing project coincident with the development of their ore properties. The company now is building 74 modern dwellings and a clubhouse at

(*Concluded on Page* 54)

This is Iron

Wonder Metal of Civilization

THAT of all metals iron is the most useful to mankind is a truth demonstrated constantly and convincingly as human ingenuity works it into new forms and adapts it to new purposes. In countless ways and unceasingly it contributes more to human necessities, comforts and luxuries, and so assists more in the advancement of civilization, than does any other metal.

IRON gives value to gold and silver as these metals are exchanged for the products of iron. It impregnates the earth; gives energy, supplies means, machinery or material in practically every effort and enterprise.

IRON is found at every turn in the daily experience of every individual; it permeates our life, and to a great extent controls it. It reflects our progress, takes shape according to our thoughts; expresses our needs and ideals. Whether we see it as some finished article, large or small, complete in itself, immediately at hand to lighten our tasks, or as some active agent of production in the mills and shops, we know it is the basic metal on which we must depend.

IRON will find still wider fields and functions; will become a necessary link in more processes of manufacture; will be found in still more combinations with other elements; ever increasing in universal use.

THE numbers of finished commodities into which the metal flows are incalculable. Iron is found in the appliances of all trades, arts and professions. It reproduces itself, from the time the jaws of the mining machine dip into the earth until the product, having fulfilled its mission, goes back into the furnace to be refined and brought forth again for a new cycle of service.

OF the purposes to which iron may be put there is no end—on this very page iron is expressing itself in new form, telling its own story. *The ink with which these words are printed was made of iron*—iron in its original form—ore from the Lake Superior ranges. The ore is the only visible part of the ink.

THE adaptability of iron stirs the imagination. Who can tell how many uses for it will be devised, the manifold purposes to which its devices will be applied? The wonder metal—the creative metal—out of the earth to the enlightenment of the world—this is iron!

A. J. H.

Radical Group To Sway Congress

Business Faces Dominance in Legislation of Minority Representing Non-Industrial States —LaFolletteism Appears as Menace to Constructive National Progress— Outstanding Trends of 1922

BY E. C. BOEHRINGER
Washington Correspondent, Iron Trade Review

BUSINESS and politics, which are official Washington's chief concern, pursued divergent courses in 1922. In business the trend was toward consolidation and co-operation. Politics took the contrasting path toward sectionalism and individual expansiveness. Save for several thrusts at the steel industry by the federal trade commission, business fared well in 1922 at the hands of official Washington; in fact, its orientation toward cohesiveness was speeded. The restiveness and dissatisfaction which had emboldened a part of congress earlier in the year erupted on Nov. 7 and, like a flare, lighted the whole political countryside and revealed what may be expected in 1923. Business in the past year was constructive while politics was destructive. It may well prove that this fortifying of business, through consolidation and co-operation, will enable it the better to withstand the legislative storm which is brewing for 1923 and disclose this trend to be more than mere chance.

Justly or no, when business adopts a course of procedure it must put that course through the screen of the Sherman, Clayton and Federal Trade acts. The repressed energies of 1921 were released by the revival of 1922 and took the form of mergers and absorptions. In practically every industry—in steel, in machine-tool building, in copper and brass, in meat packing—smaller units elected to lose their entities in large corporations. These mergers and absorptions were subjected to the scrutiny of the department of justice and the trade commission, flanked by the antitrust laws. The eye of the department of justice proved kindly and its vision was broad. The trade commission waxed aggressive only in the case of the steel industry, probably because that industry seems to be its favorite hate.

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LAFOLLETTE ALWAYS RADICAL WITH LITTLE TO SHOW FOR HIS YEARS OF RANTING. HE ASPIRES TO DIRECT THE RADICALISM OF THE COMING CONGRESS

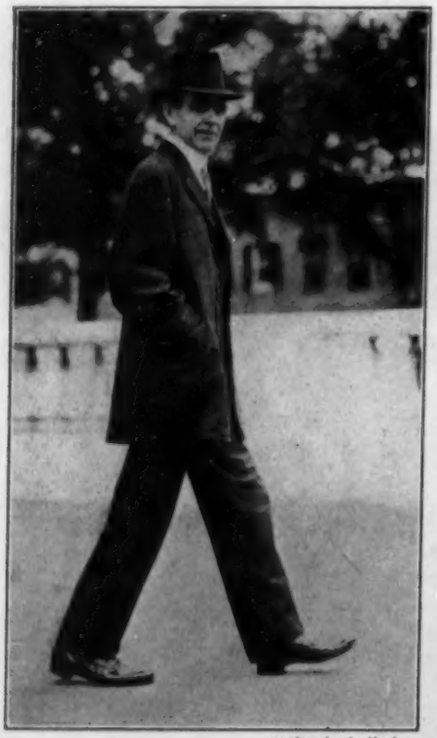
Now, the spirit which prompted the enactment of these antitrust laws was that of fostering competition, of protecting the small interest from the large one, of preventing even "good trusts" becoming monopolistic. The trade commission has lustily proclaimed itself the champion of the small producer and set itself up as his guardian. Yet, in 1922, these small producers emerged from the trade commission's gratuitious wing, eyed enviously the advantages accruing from integration and the momentum induced by a large body, and decided that they too would become big.

The spectacle ensued of small producers coming under suspicion while their models remained guiltless—and guileless! Only in the case of the steel mergers has the trade commission become vocal, but watch it in 1923!

These mergers in steel and in other industries have been within the pale of the antitrust laws. For some years the LaFollettes on Capitol Hill have been railing against big business and special interests and special privilege and all that sort of thing. But what did the farm bloc in congress do last spring but pass the farmer co-operative marketing act, permitting the farmer to do some of the things found reprehensible in business and more too—all exempt from the antitrust laws. Despite the decision of the Supreme Court in the Coronado Coal case last June organized labor continues to enjoy all and more of the advantages and privileges of big business, in a co-operative way—and again beyond the reach of the antitrust laws.

Still another case in point is that of the trade associations, which are the exemplification of co-operative action. Confusion into which the trade associations were thrown by the Supreme Court decision in the so-called hardwood case in December, 1921, prompted Secretary of Commerce Hoover to seek joint action with Attorney General Daugherty. In February came a joint statement succinctly setting forth what trade associations could and could not do. Secretary Hoover blazed a new path when he reiterated throughout the year his belief that economic collective action can be in the public interest as well as against it. In his annual report to congress in December he urged liberalization of the antitrust laws. Consider what a milestone has been reached when a member of the President's cabinet dares to advocate a broadening of the Sherman act! A development indeed which eclipses anything a LaFollette or a Brookhart may propose. What Secretary Hoover stated on this point may well be recorded:

"The country has now had many years' experience with these acts; they have received constant interpretation by the courts, and the working results in our economic fabric in some direc-



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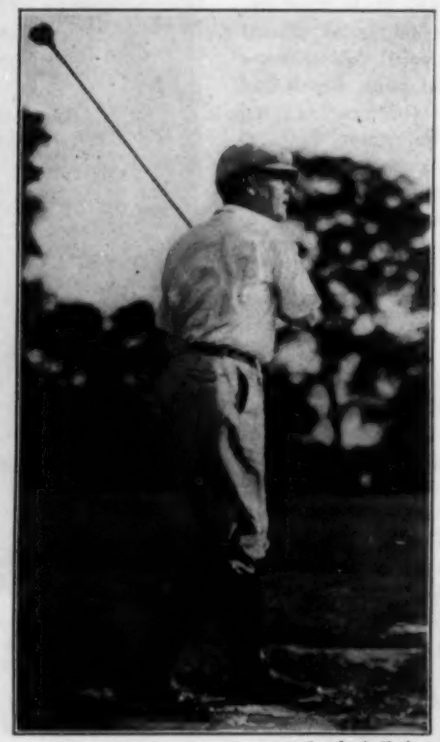
SENATOR ARTHUR CAPPER OF KANSAS
Farm Paper Editor and Farm Bloc Leader

tions are out of tune with our economic development. No one would contend that there be relaxation in the restraints against undue capital combinations, monopoly, price fixing, domination, unfair practices, and the whole category of collective action damaging to public interest. There has been, however, a profound growth of understanding of the need and possibilities of co-operative action in business that is in the interest of public welfare. Some parts of these co-operative efforts are inhibited by law to-day, but, of much wider result, many are stifled out of fear or shackled from uncertainty of the law. The two latter factors are far more widespread than can be appreciated except through wide contact with economic activities, and they definitely impede our national progress upon right lines. Relaxation of the acts has already been given by legislation in favor of the farmer and trades unions, but the farmer and laborer are being even more greatly injured by these destructive shackles upon business in many directions, which produce instability of employment and increase distribution costs, than they were by the direct influence of these acts upon their own affairs.

"At the time the Sherman act was passed, the country was in the throes of growing consolidations of capital. These were consolidations of actual ownership, and the country was alive with deserved complaint of domination in business, in attempts to crush competitors with unfair practices and destructive competition. Collective action in its sense of benefit to public interest was much less known and, at any rate, was probably not contemplated as coming within the meaning of the act. In any event there is a wide difference between the whole social conception of capital combinations against public interest and co-operative action between individuals which may be profoundly in the public interest. The former extinguishes individualism through domination; the latter greatly advances it and protects it. Co-operative action has, however, struggled for development through the growth of chambers of commerce, trade associations, and conferences of one kind and another in an effort to meet various sorts of crises, to improve business standards, and to eliminate waste in production and distribution.

"It is true that some minority of such activities has been used as a cloak for action against public interest, but it is also true that a vast amount of action in public interest has been lost and even great national calamities brought upon us by lack of co-operative action. A case in point is that the instability of the bituminous coal in-



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SENATOR R. L. OWEN OF OKLAHOMA
Of Indian Ancestry and Proud of It

dustry and the disintegration of its employers' associations by pressure under the restraint of trade acts contributed directly to the prolongation of the coal strike, as no adequate organization of operators existed which could meet and bargain with the workers who were free from all restraint. The whole movement toward co-operative action arises from a fundamental need to which we must give heed. Where the objectives of co-operation are to eliminate waste in production and distribution, to increase education as to better methods of business, to expand research in processes of production, to take collective action in policing business ethics, to maintain standards of quality, to secure adequate representation of problems before the government and other economic groups and to improve conditions of labor, to negotiate collectively with highly organized groups of labor, to prevent unemployment, to supply information equally to members and to the public, upon which better judgment may be formulated in the conduct of business; then these activities are working in public interest. There are some twenty-odd different functions of co-operative action which are at the same time in the interest of the different trades and the community at large. Any collective activity can be used as a cloak for conspiracy against public interest, as can any meeting of men engaged in business, but it does not follow, because bricks have been used for murder, that we should prohibit bricks. There is, moreover, a very wide differentiation between co-operative action open to an entire trade or region of a trade and capital combinations, because the former may be dissolved instantly without any disturbance of capital or production and does not represent increasing domination of a group of individuals in a trade, but the democratic development of a whole industry.

"It has often been argued that the original intent of the restraint of trade acts was not to inhibit any sort of economic collective action which was in interest of public welfare, and that the time has come when the act should be limited so as to leave free all such action. Without entering upon debate as to the difficulties of such a course it is possible to consider a narrower field of liberalization of law; that is, for the law to be liberalized to the extent that co-operative organizations generally, as distinguished from capital consolidations, should be permitted to file with some appropriate governmental agency the plan of their operations, the functions they proposed to carry on, and the objectives they proposed to reach; that upon approval such of these functions as did not apparently contravene public interest might be proceeded with;

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SENATOR W. E. BORAH OF IDAHO
To the Front on Every Question, Right or Wrong

that upon complaint, however, either of individuals or the law officers of the government that these functions had reacted against public interest, then after a hearing before some suitable tribunal the right to continue these particular functions should, if the complaints are justified, be suspended. If thereafter these functions were continued, or if it should be proved that the activities had been extended beyond the functions in the original proposals, the organization should be likewise subject to prosecution under the present acts. Parties who did not wish to avail themselves of this privilege could continue in the present status.

"All who know the situation in such matters will realize that the problems of co-operative action are mainly the concern of the smaller businesses. Such a measure as that suggested above would serve actually to protect small business and thus to maintain competition. Big business takes care of itself. Legitimate trade associations and other forms of business co-operation would be greatly stimulated along lines of public welfare if such a plan were adopted. It appears to me that the time has come when we should take cognizance of these necessities if we are to have a progressive economic system. Its growing complexity, its shift of objective and service, require a determination based upon a proper sense of maintenance of long-view competition, initiative, business stability, and public interest."

The trend toward consolidation so manifest in the steel industry throughout 1922 corresponds aptly to the co-operative movement not subject to the antitrust laws. It has caused some comment that the trade commission, which has never brought monopolistic charges against the United States Steel Corp., should raise instant objection when the Bethlehem Steel Co., Lackawanna Steel Co., Midvale Steel & Ordnance Co., Inland Steel Co., Republic Iron & Steel Co., Brier Hill Steel Co. and Youngstown Sheet & Tube Co. sought to acquire for themselves some of the advantages the Steel corporation enjoys—and enjoys with the tolerance of the trade commission. This swing back from individualism to collectivism arrested more and more attention as the year wore on. The trade commission has become both suspicious and antagonistic. The department of justice apparently is acquiescive. Congress may be expected to further it insofar as it may seem to offer relief to the farmer.

TWELVE senators from the 11 states shown in black have formed a senatorial flying wedge and threaten to dominate the upper house at least until March 4, 1925. Neither orthodox Republicans nor Democrats can put over a program without the approval of this wedge. Some of the 12 are personally antagonistic but no defections apparently can be hoped for when it is an alignment of the radicals and farmers of the West against the business of the East.

These 11 states constitute a woeful minority. Numerically, they are but 22.9 per cent of the Union. They have an area of 875,094 square miles or 28.9 per cent of the entire country. Their population is 15.2 per cent of that of continental United States.

Of the $62,418,078,773 worth of manufactures produced in 1919 they accounted for $6,486,256,000 or 10.4 per cent. They paid only 5.5 per cent of the $2,086,918,464 income and profits taxes collected in fiscal 1922. Their wage earners in industry in 1919 numbered 662,035 or 7.3 per cent of the total of the entire country. In 1919 the capital invested in manufacturing was $44,579,093,771. and these 11 states boasted of $4,208,432,000 or 9.5 per cent. Of the 10,465,995 automobiles and trucks registered in 1921 they had 22.8 per cent. Their commercial failures in 1921 were 14.1 per cent of the 19,652 occuring in the country.

Even in agriculture, this 11-state bloc is far in the minority. The farm lands of the United States added up to 995,883,715 acres in 1920 and these states included within their borders 332,969,956 acres or 34.8 per cent. The 1920 value of all farm lands, livestock, buildings, implements and vehicles was $77,924,100,338, of which these states had 40 per cent or $31,227,602,031.

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FIRST MEETING OF RADICAL-FARMER SENATORS AND REPRESENTATIVES AT WASHINGTON DEC. 1. SEATED, SECOND FROM THE LEFT IS SENATOR LAFOLLETTE, FIFTH FROM THE LEFT IS SENATOR LADD OF NORTH DAKOTA, AND ON THE EXTREME RIGHT IS SENATOR NORRIS OF NEBRASKA. STANDING, AT THE EXTREME RIGHT, IS SENATOR-ELECT FRAZIER OF NORTH DAKOTA. STANDING ON MR. FRAZIER'S RIGHT ARE SENATOR-ELECT SHIPSTEAD OF MINNESOTA AND SENATOR-ELECT WHEELER OF MONTANA

A possible development of 1923 is the trade commission espousing the cause of the consumer as against both small and large producers.

But far more spectacular and appealing to the popular imagination in 1922 was the political revolt which culminated in the explosion of Nov. 7. The voting was wholly negative—against the existing order rather than in approval of any radical program. The result was to place the control of congress for the two years ending with March 4, 1925, in the hands of a woeful minority coming from the northern tier of states from Minnesota to the Pacific and from Minnesota south to Oklahoma, like a wedge into the heart of the Middle West. How detrimental to business and industry this so-called radical-farmer group becomes apparently depends entirely upon one man—Robert M. LaFollette, Republican senator from Wisconsin, who is attempting to assume its leadership.

Eleven more senators comprise this radical-farmer group—Edwin F. Ladd and Lynn Frazier, of North Dakota; Peter Norbeck, of South Dakota; George W. Norris, of Nebraska; Smith Brookhart, of Iowa; Arthur Capper, of Kansas; Robert L. Owen, of Oklahoma; Burton K. Wheeler, of Montana; William E. Borah, of Idaho; Henrik Shipstead, of Minnesota; and C. C. Dill, of Washington. Left to themselves, it seems likely they would concentrate on legislation calculated to alleviate the lot of the farmer, and if any real harm accrued to business it would be incidental to the constructive program in behalf of the farmer. But under the leadership of Senator LaFollette anything may happen. He will indulge in parliamentary hooliganism on the floor of the senate. His hatred of business—it amounts to a hatred—is overweening. The decision of this group to bore from within the two parties presents possibly more danger to business than were a third party to be formed; it means constant, guerilla warfare and uncertainty.

Provided this group of 12 is cohesive and forms in the next congress, the flying, legislative wedge that it threatens to, it can align itself with either regular Democrats or regular Republicans and insure the passage of any measure. But it will find itself against the veto power of the President and a minority in the senate adequate to prevent the over-riding of this veto, if it gives its radicalism full sway. President Harding is a man essentially of compromise, and he may be expected in 1923 to proffer the olive branch to the disaffected Republican states of the West in the form of enlarged rural credits, the placing of a real dirt farmer on the federal reserve board and possibly some further reductions in freight rates. He may, however, be relied upon to stand firm against any dangerous overturning the radical-farmer group may sponsor. It would not be surprising if Senator LaFollette overreached himself, and the President "found" himself through the necessity of assuming the conservative yet forward-looking leadership the United States so desires.

Business Menaced by Group

This radical-farmer group does present a very grave menace to business. The flood of stock dividends in the latter part of the year was let loose partially because of the fear of heavy impositions upon surpluses, either in a new revenue act or by amendment of the present act. The minimum demands of the group so far as the transportation act is concerned are elimination of the so-called guarantee clause and restoration of the powers of the state commissions. This emasculation of the transportation act the group believes to be requisite to reduced freight rates on farm products and livestock. Considering the freight rate structure as a whole, rates in 1922 averaged 11 per cent lower than in 1921. It would not be surprising if the interstate commerce commission sought to appease the radical-farmer group by allowing further reductions on farm products and livestock in 1923. In the last analysis, the damage the radical-farmer group can accomplish will depend entirely upon whether a special session is called by the President after March 4. The status quo is expected to continue until that date. If the necessary appropriation measures have been passed it is likely that the President will choose to give the country a legislative holiday and not call congress until fall, if he does not permit the new radicals to stay at home until the regular session which convenes the first Monday of December, 1923.

A real advance in tariff-making was recorded in the enactment of the Fordney-McCumber tariff which became effective on Sept. 21. The flexible provisions of the act, provided they are exercised judiciously, should come close to silencing much of the protest the act has raised. Briefly, objection to any rate of duty may be lodged with the

United States tariff commission. The President, upon recommendation of the commission, may increase or decrease duties up to 50 per cent, although he may not transfer commodities from the free list to the dutiable list and vice versa. Such changes, however, must be based upon the cost of production and whatever revisions are ordered by the President must be projected for the purpose of equalizing costs of production here and abroad. To date the tariff commission has blanketed with secrecy all protests against rates and all requests for increases or reductions. The metals division of the commission, of which Paul M. Tyler is chief, has, however, been expanded in anticipation of much work of an investigative character. Whether the commission undertakes an investigation or deems any matter unworthy of action rests largely upon the recommendation of Mr. Taylor. Abandonment of its policy of silence on all protests is looked for early in 1923, when the commission's organization has been fully developed. For the fiscal year beginning next July 1 the budget commissioner has allotted the commission $700,000, compared with the $345,000 it has had available this fiscal year. Politically, there is hope that the tariff commission may take the sting out of objections to the tariff act.

Quantities of verbal red fire were released on Capitol Hill both before and after the Nov. 7 election by radicals and the farm bloc, yet the radical imprint upon the legislative record of the year was light. No revenue legislation was passed in 1922. The transportation act remained unamended. The Borah act setting up the federal coal fact-finding commission revealed a pink tinge in the provision authorizing the commission to report on the feasibility of nationalization of the coal industry but this act, like the Winslow antiprofiteering act, was largely a gesture. The coal commission is going through the motions of ascertaining once more that intermittency is the chief evil of the coal industry. The anti-profiteering act, belying its name, was utilized largely in speeding bituminous coal up the Great Lakes and in insuring the retention of practically all opentop car equipment in the coal trade. The soldier bonus bill met an untimely end in the senate after its veto by the President. The administration ship subsidy bill passed the house in November, although its fate in the senate is uncertain.

If politics has its way in 1923 congress will be in almost continuous session—writing a new tariff, revising or repealing the transportation act, putting more dirt farmers on the federal reserve board, seating at least two progressives on the Supreme Court bench, making rural credits larger in volume and easier of procurance, giving the ex-soldiers a two or three billion dollar bonus, enlarging the power of the trade commission, forcing Attorney General Daugherty out of office, and housecleaning Washington and the statute books in general. Business would broaden the 3 per cent immigration act, strengthen the transportation act, reduce the income surtaxes and seek to stabilize the coal industry. But there is no question that business would sacrifice its desires if a legislative holiday would keep some of the political boll weevils at home.

Washington Year On Business Subjects

Jan. 30—Federal trade commission begins Pittsburgh basing point complaint hearing.

Feb. 16—Secretary of Commerce Hoover issues exhaustive statement giving limits to which he and Attorney General Daugherty have agreed trade associations may go.

March 4—District of Columbia supreme court permanently enjoins federal trade commission in Claire Furnace suit from exacting monthly cost reports from iron, steel and coke producers.

May 11—President signs bill extending 3 per cent immigration act to June 30, 1924.

May 18—President dines leading steel producers at White House and asks for elimination of 12-hour day.

June 5—Federal trade commission issues formal complaint charging Bethlehem Steel Corp. with violating Clayton and federal trade acts by absorbing Lackawanna Steel Co. Supreme Court in Coronado Coal Co. decision declares that labor unions are suable under Clayton act for treble damages resulting from strikes.

July 1—Interstate commerce commission general reduction of 10 per cent in freight rates is effective.

July 22—Attorney General Daugherty approves both Bethlehem-Lackawanna and Midvale-Republic-Inland steel mergers.

Aug. 31—Federal trade commission charges Midvale-Republic-Inland merger with violating Clayton and federal trade acts.

Sept. 21—President signs Fordney-McCumber tariff bill and it becomes effective at midnight.

Oct. 5—Federal trade commission withdraws Midvale-Republic-Inland complaint because merger has been abandoned voluntarily.

Nov. 21—Federal trade commission concludes presentation of its evidence against United States Steel Corp. in Pittsburgh basing point case.

Nov. 29—House passes ship subsidy bill.

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Assistant to the chief of the metals division

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PAUL M. TYLER
Chief of metals division of the tariff commission

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Assistant to the chief of the metals division

Tool Builders Prepare for Needs of Industry

BY E. F. ROSS

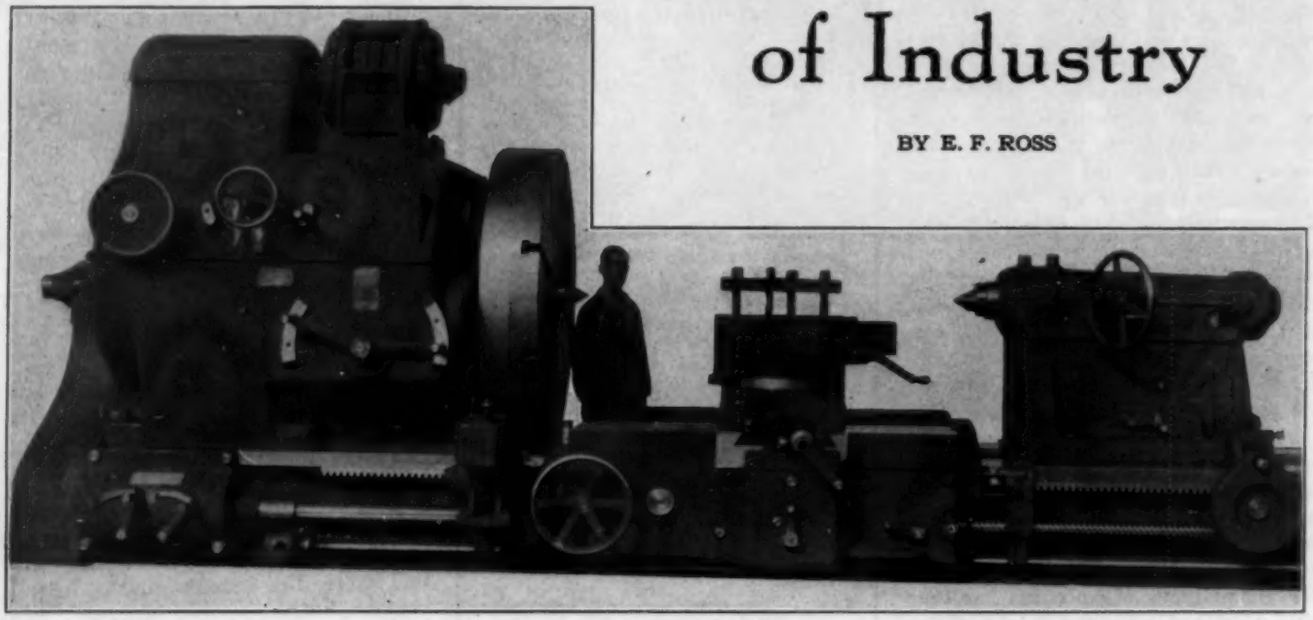

Fig. 1—This 60-inch heavy-duty lathe reflects the modern improvement which has been made in this class of equipment. The driving motor is mounted on the head

IT WILL be recalled that last year's review of machine tool development emphasized the fact that during 1921 the industry was passing through a period of depression which was taxing the courage and resourcefulness of even the most experienced manufacturers. At this time it may be stated that the period of anxiety has been passed safely for the majority of makers, particularly those who had adopted policies in keeping with general business conditions. From this it is not to be inferred, however, that builders of machine tools have enjoyed increased business to the same extent that the metal working industry has been restored to a more nearly normal basis, for it is well known that activity in the machine tool field lags behind that in other branches of the metal industry. Without doubt this is due to the tendency for manufacturers to await the return of normal operations before installing new equipment or replacing old. With machine tool activity at its low point in 1921, builders concentrated their energy in perfecting tool designs to meet the demands of industry during its climb back to prosperity. The keen competition which has been typical of 1922 has attested to the sanity of that policy.

The trend in design noted in 1921 has been carried on in 1922, judging from the new tools and improvements announced during the year. Briefly the tendency is toward the greater use of individual motor drives; placing motors in machine bases or mounting them as close as possible to the driven parts to reduce gearing, the design of more machines of the automatic type; and a more insistent demand for accuracy. In addition, the demands of quantity production are leading to the design of more specialized and single purpose machines. This has resulted in a reduction in the number of speeds and feeds, thereby eliminating some of the inherent difficulties caused by large trains of gearing, high velocity ratios, high gear speeds and enabling the designer to increase the available power. One authority on machine tools and their design points out the need for a more specific method of rating. He states that a 100-horsepower motor is expected to give a specified performance regarding speeds, torques, power, overload, etc. Likewise steam boilers, engines, generators and a number of other power machines are definitely rated and guaranteed to perform certain economies and powers for which they are designed and sold. But what is to be expected of a 20-inch lathe? Does the average user, buyer, or designer of the lathe use any basis upon which he can judge the performance of such a machine? This critic does not agree with the constants used in the development of Nicholson's analysis

FIG. 2—MILLING MACHINE PRODUCTION HAS BEEN SPEEDED UP BY PROVIDING A TUB FOR THE CUTTING COOLANT

method but states that it has some value in specifying the speeds, powers and torques available on a machine. Yet, a more definite basis of comparisons is desirable and would be of great value to users of machine tools. Builders of tools, however, will not spend much time in developing such an analysis until it is demanded by the users. On the other hand, an investigation of many machine tools by using Nicholson's analysis and other schemes, shows that the more recent designs of tools come nearer satisfying the Nicholson diagram. This is an indication that the latest tools have better torques, better arrangements of speeds, more attention is being paid to the accuracy of gearing of the power train and feed, and the machines have been made more rigid.

For the purpose of gaging the activity of the machine tool industry during 1922, certain statistics for the period 1919-1922 were taken from two publications devoted almost exclusively to machines and tools. From these sources it was found that 136 new machine tools were announced in 1919; 128 in 1920; 156 in 1921; and approximately 138 in 1922. Thus 1921 assumes the leading position with 1922 running second. It was found further that various types of machines introduced each year held corresponding positions in the totals column. In order of their numbers the classification is as follows: Grinding machines, first; lathes, second; drilling machines, third; milling machines, fourth; and boring machines, fifth. Miscellaneous machines not classified above aggregated about half of the rest put together or approximately 33 1/3 per cent of the total number of tools introduced. Among miscellaneous tools are included machines for specialized or single-purpose production.

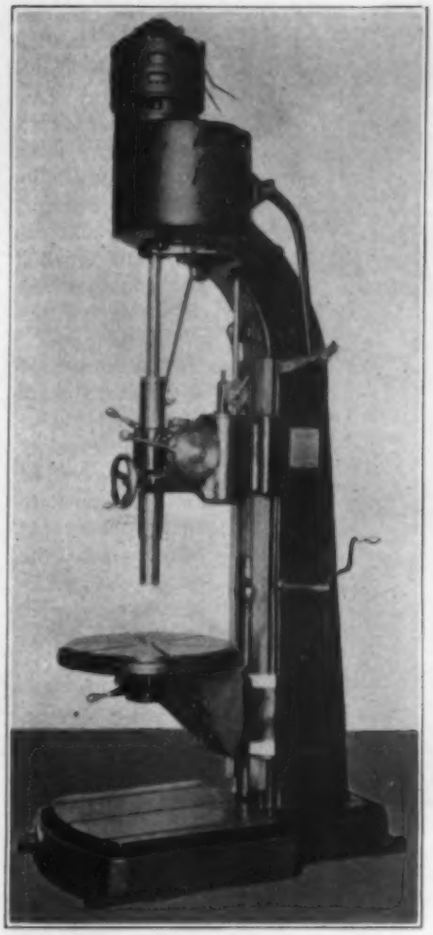

FIG. 4—VERTICAL DRILLS INTRODUCED DURING THE PAST YEAR SHOW A TENDENCY TOWARD DIRECT DRIVE

Grinding machines continue to retain their lead, reflecting their increased use in manufacturing operations, both from the standpoint of speed and accuracy. Another feature of the developments of 1922 is the introduction of light sensitive drilling machines. This has been due to the expansion of the electrical industry through the great demand for radio broadcasting and receiving equipment.

In reviewing the developments in machine tool design during 1922, no attempt is made to mention all newly designed machines as these already have been described from time to time in IRON TRADE REVIEW. Instead, the author will point out the trend of machine tool design during the year, referring to certain typical machines and pointing out their important features.

Chief among various improvements are those made in radial drills. A machine embodying several significant changes is shown in Fig. 6. Mounting the driving motor on the back of the arm of the drill has resulted in a simple and economical machine. This construction is claimed to save from 20 to 25 per cent in power due to the elimination of several shafts and spur and bevel gears. At the same time the mounting of the motor on the back of the arm also serves to balance the arm, and permits the arm to ascend

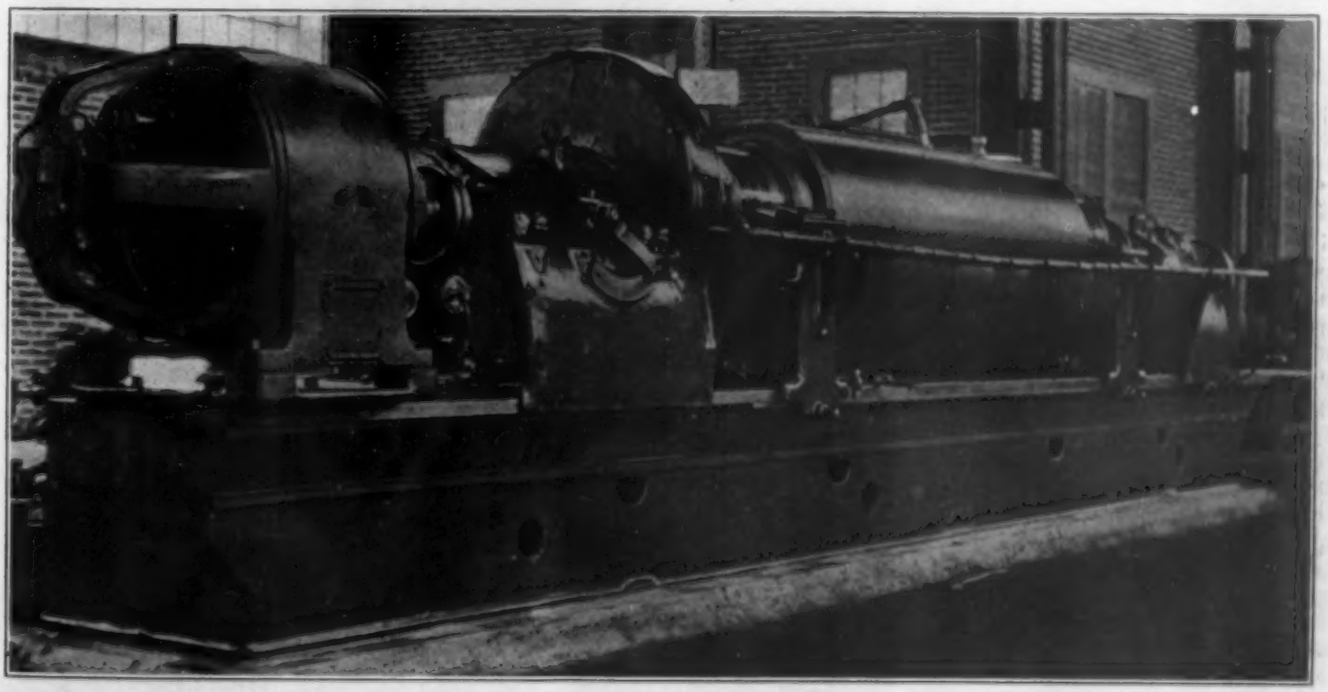

FIG. 3—A NEWLY DESIGNED GRINDER FOR MILL ROLLS. BY MEANS OF AN ATTACHMENT EITHER CONCAVE, CONVEX OR STRAIGHT FACES CAN BE OBTAINED. THREE SEPARATE MOTORS PROVIDE THE POWER FOR OPERATION

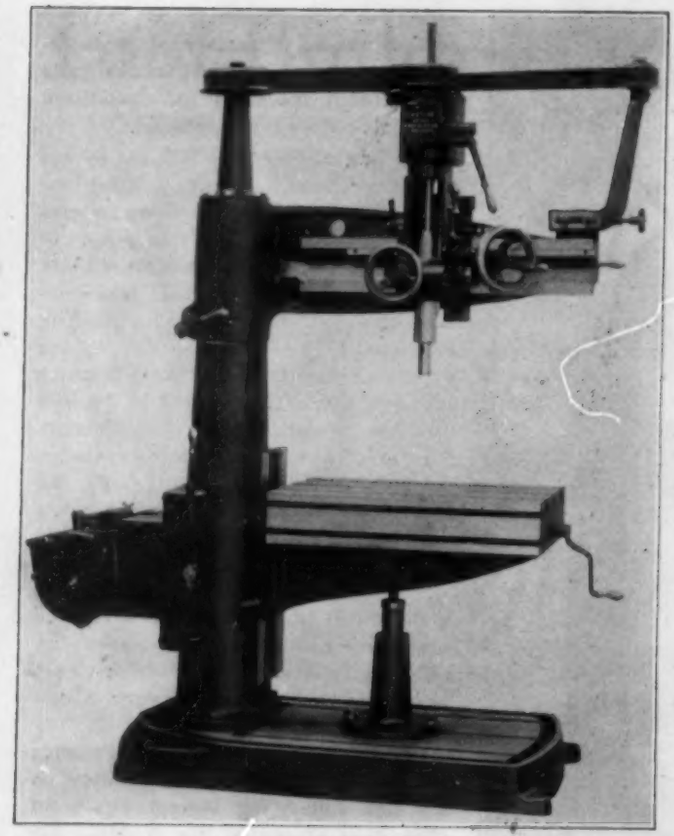

FIG. 5—THE APPLICATION OF FRICTION BACK GEARS TO RADIAL DRILLING MACHINES IS ONE OF THE IMPROVEMENTS IN RECENT MODELS

or descend on the column with the minimum of strain on the elevating screw. The raising and lowering mechanism, as shown in the illustration, is mounted as a unit on the back of the arm near the motor drive gears and is in operation only when the arm is being raised or lowered. The screw is stationary. The controller is mounted below the motor and is within easy reach of the operator. A 3½-horsepower motor is sufficient to furnish the required power.

A similar type of machine is shown in Fig. 5. This type of drill is designed for work that is too heavy for a high speed sensitive drill and too light for a heavy duty radial drill. The arm, which is sensitive in its movement, may be swung completely around the column and is supported on both annular and thrust ball bearings on the column which extends through to the top. Friction back gears are a new feature for a machine of this type and permit quick shifting from high drilling speeds to slow speeds. A reservoir for the coolant is cast in the base. While the illustration shows a machine of the belt-driven type, provision is made for mounting a driving motor on the part of the table projecting to the rear.

Another tendency in the design of vertical drills is that of direct motor drive as shown in Fig. 4. In this machine the driving motor has been mounted at the extreme top of the machine with the motor shaft parallel to the drill spindle and connected to it through a set of cluster gears. On the lower end of the motor shaft is a small pinion which engages with a gear of an intermediate shaft. Mounted below on the same intermediate shaft is a set of sliding cluster gears which engages with another set of cluster gears on a second intermediate shaft, which in turn drives the drill spindle. A lever affords the proper means of gear selection to obtain desired speeds. Both the top and bottom bearings of the motor are mounted in ball bearings and the spindle thrust is taken up by a bearing of the same type.

Features of heavy duty drilling machines included simplicity of general design and extreme sturdiness of construction. Brackets and bolted-on devices have been reduced to a minimum and a number of internal mechanisms have been eliminated. Bending stresses due to the present extremely high drilling pressures are absorbed by the use of rigid uprights reinforced by strong heads. In some cases driving power is supplied by single pulley drive through a friction clutch. By this method no countershaft is required and a slight saving in power is effected.

Development of light drilling machines has consisted largely in the application of higher speeds, the use of multiple spindles, and the placing of driving motors either at the top of the machine or well up on the rear of the column. This type of drill is finding wide use in the electrical industry for the production of radio equipment parts made from light material. In most cases the multiple spindles are grouped in a small head deriving its power from the main spindle. Each spindle is a complete unit and may be used individually as desired. Economies in time have been effected by the use of rapid automatic belt-shifting

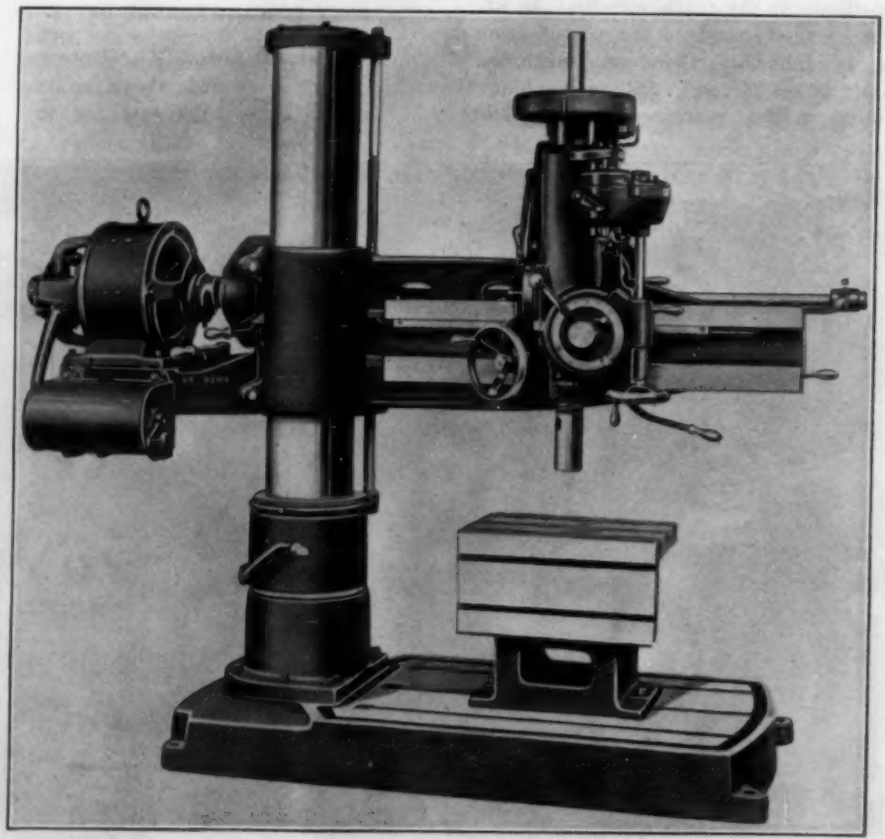

FIG. 6—PLACING THE MOTOR ON THE BACK OF THE ARM OF A RADIAL DRILL PROVIDES MORE DIRECT DRIVE AND COUNTERBALANCES THE ARM

devices for obtaining speed variations.

Electrical and other light manufacturing operations have been responsible for a revival of the bracket-type, swinging wall drill popular many years ago. These are of two types, one being belt or motor driven while the other utilizes a portable hand drill which may be removed as desired. A number of special or single purpose drilling machines were introduced during the year but these were confined largely to use in the automotive field. Some of these were of the horizontal lathe type and were designed with the driving motor suspended underneath the bed.

Although few lathes were developed in 1922, those which were announced reflect the same tendencies in design as in 1921, namely the building of machines having greater dimensions and driving by the geared head method with the driving motor mounted on top of the head. A lathe of the heavy type having a 60-inch swing is shown in Fig. 1. Speed change gears located on the headstock provide a range of 24 faceplate speeds; however where an adjustable speed, direct-current motor can be used, the geared speed change can be omitted without reducing the speed range of the faceplate. The control of both direct and indirect motors is located on the carriage where they are within convenient reach of the operator. To provide protection all gears are completely inclosed. The geared head lathe shown in Fig. 9 may be considered typical of modern machines ranging in sizes from 16 to 30 inches. This type of lathe is particularly adapted to general shop conditions. Both belt drive and individual motor drive are available, and in the case of the latter, the motor may be mounted either on top of the headstock or rear of the cabinet leg as shown by the broken lines in the illustration. Another feature of this machine is that power is transmitted to the headstock through a powerful disk clutch which includes a brake. This clutch, having a neutral position, disconnects the spindle from all gearing and removes the flywheel effect obtained by having heavy gears attached to the spindle. This saves considerable time while centering irregular work in a chuck or in the machining of small parts where chucking time is an important factor. Twelve spindle speeds are available, these being manipulated by the three handles shown in the front of the head. One of the advantages of a general utility lathe of this type is that stock of small diameter can be worked at speeds equally as economical as work taking the full swing of the lathe.

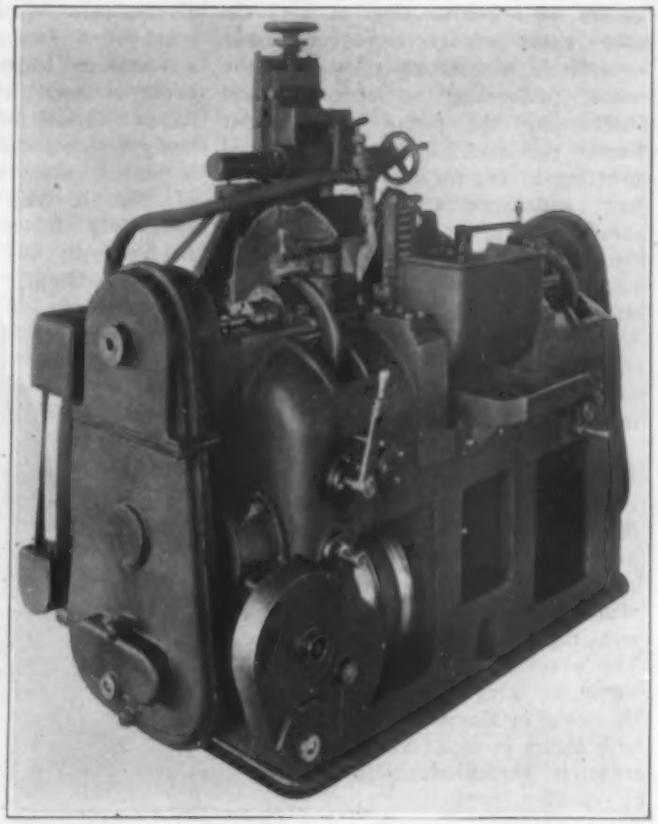

FIG. 8—FEATURES WHICH TEND TOWARD COMPLETE AUTOMATIC OPERATION ARE TO BE FOUND IN PRESENT DAY GRINDING MACHINES

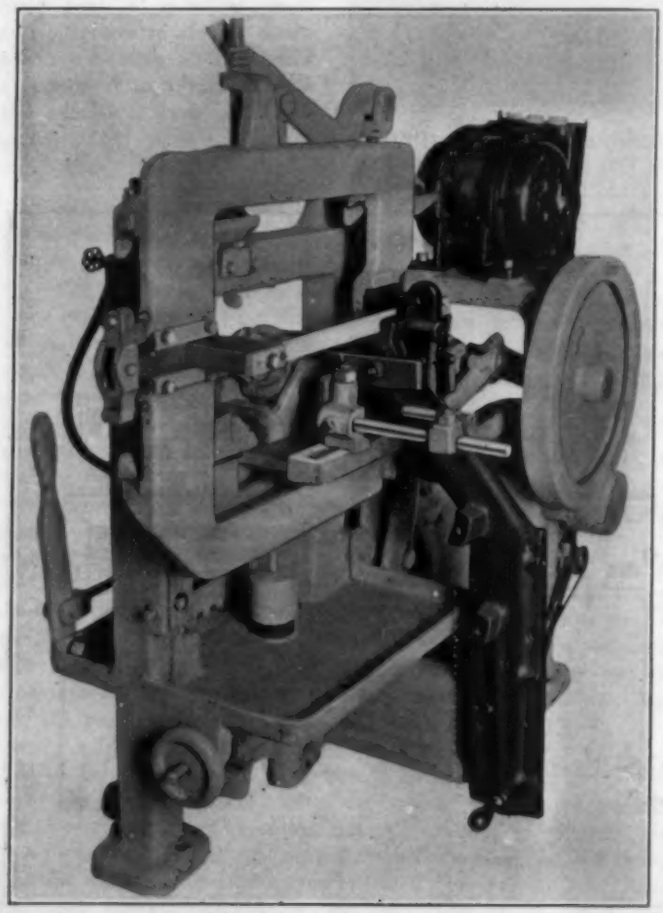

FIG. 7—THE RANGE OF WORK WHICH CAN BE HANDLED BY SHAPING SAWS HAS BEEN GREATLY INCREASED BY IMPROVED DESIGNS OF EQUIPMENT

The general tendency to speed up productivity of all types of machine tools is exemplified in the vertical milling machine shown in Fig. 2. Its general design varies widely from the general construction of vertical millers. Probably the most striking feature of this machine is the cylindrical pan or tub for holding the cutter cooling compound. With ample cooling provided, cutter speeds may be increased considerably without danger of burning the cutters. Power from the motor mounted at the rear is transmitted through shafts and gears to two vertical spindles which are given a wide range of speeds by means of pick-off change gears. The table, which is 30 inches in diameter, is drilled and tapped for jigs to facilitate production work. A fully inclosed helical gear running in oil rotates the table.

Probably the two outstanding developments in grinding machines have been the extended use of automatic features and the introduction of ma-

chines for a heavier class of work. In some cases grinders have been made completely automatic; taking on the work, performing an operation and discharging the pieces with almost human precision. Since the advent of grinding in the metal-working field, it has undergone a phenomenal and steady growth until today many operations considered possible only by the means of cutting tools have been accomplished completely by abrasive wheels. Both roughing and finishing operations are now handled satisfactorily and economically by this method.

In the accompanying illustration, Fig. 8, is shown a full automatic plain grinding machine for cylindrical grinding of machine parts on centers. All parts are ground on centers or in drawing-in chucks. The massive construction of the machine effectively absorbs the vibration of moving parts. The wheel head is heavy and designed to carry a grinding wheel 18 inches in diameter and up to 6 inches in face. The machine is particularly adapted to quantity production, average sized parts being turned out rapidly. One operator can run from one to four machines. Included in the work which can be accommodated are shafts, shackle bolts, king bolts, valve tappets, piston pins and a wide range of machine parts from ½ inch diameter upward and having a maximum length of grind of 6 inches and a maximum length between centers of 10 inches. Typical of the heavy grinding machines is the roll grinder shown in Fig. 3. This machine was designed to finish all types of hot and cold mill rolls formerly finished by roll turning lathes. The roll shown in the illustration weighs 16,000 pounds. The machine is self-contained and is driven by three separate motors, one driving the work which is mounted on the bed of the grinder and directly connected to the headstock, one mounted on a carriage traveling on a track at the back of the machine for driving the grinding wheel, and a small motor directly connected to the water pump. All motors are controlled by push buttons on the operator's platform, which is mounted on the grinding wheel carriage. A special feature of the machine is an attachment for grinding the face of the roll either concave, convex or straight. The roll is so mounted in the bearings that the journals may be ground without changing the position of the roll, thereby insuring the roll body and journal being concentric. It is said that in production this machine has removed as much as 7 cubic inches of chilled iron per minute without a sacrifice of accuracy or sensitiveness. A number of other significant features have been noticed in recently designed machines. Surface grinding machines have reflected much improvement. One such double spindle machine embodies a feed plate which travels between the two wheels. This plate is equipped with a number of resources in which the work is located and carried between the grinding wheels. As the work ap-

FIG. 10—APPLICATION OF THE DOWN-STROKE PRINCIPLE HAS GREATLY INCREASED THE NUMBER OF GEARS WHICH CAN BE CUT WITH THIS SHAPER

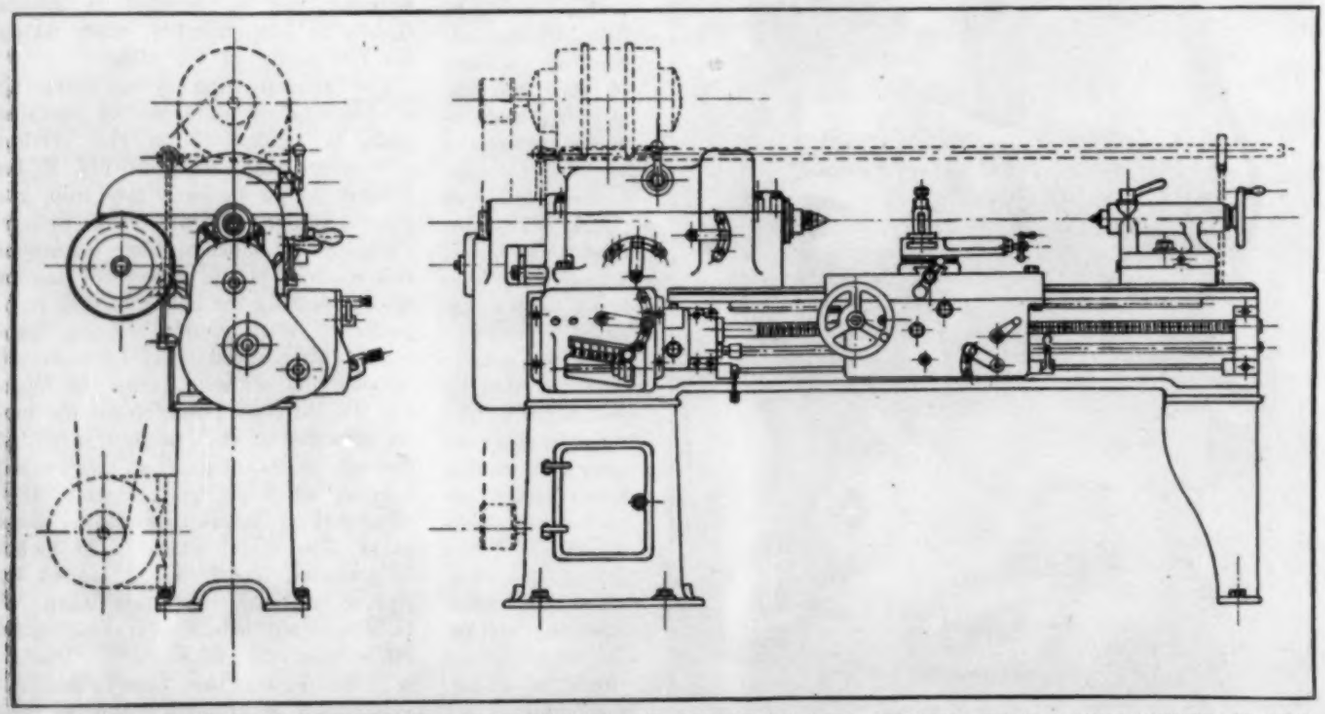

FIG. 9—THE GENERAL TENDENCIES IN LATHE DESIGN ARE SHOWN IN THIS GEARED HEAD LATHE WHICH IS CONTROLLED BY A FRICTION CLUTCH. THE DRIVING MOTOR MAY BE MOUNTED EITHER ON THE HEADSTOCK OR REAR OF THE CABINET LEG

proaches the grinding position one of the wheels advances automatically until its movement is arrested by a stop. The wheel advances under an adjustable spring pressure so that its movement is controlled by the amount of stock removed in grinding, which results in a constant grinding pressure. The grinding wheel is returned to the back position by a cam action and the work is unloaded automatically as it passes out of the grinding range. Another type of surface grinder embodies a plate that travels automatically over the magnetic chuck thus bringing the work into position to the grinding wheel.

Departs from Conventional Design

Many of the grinding machines developed during 1922 were single purpose grinders being designed for the production of some one specific product. This tendency has been noted particularly in the manufacture of automotive parts such as crankshafts, pistons, etc. One such machine of the vertical spindle type showed a radical departure from conventional lines. This grinder can be set for a given operation and operated for several months with a minimum of attention. It embodies a fixed wheel spindle operated by an electric motor and a revolving and reciprocating work spindle, also electrically driven. As the work spindle rotates and reciprocates in the same bearing, the production of straight holes is assured. Two motors are utilized, one to drive the wheel spindle and the other the work.

In the review last year it was stated that one of the radical departures from conventional ideas was a new type of gear shaper which cut all teeth simultaneously. The particular feature of the machine was a special tool head consisting of a series of radially disposed tools placed around the circumference of the gear blank to be cut. These tools were rigid and the gear blank reciprocated past them, thus cutting all the teeth, making one stroke or cut on each tooth at the same time. The former method, of course, was to cut one tooth completely and then to move on to the next, whether the cutter was circular or shaped according to the space between the two teeth and making as many cuts as necessary. In the new tool head the tools were gradually drawn in toward the center, the gear blank reciprocating until the cutting was complete.

It is not necessary to elaborate here upon the design and operation of that machine as they were discussed last year. It will be sufficient to say only that this machine was of the up-stroke type in which the gear blanks mounted on an arbor were passed upward through the tool head which remained stationary. Obviously, work which could be produced was limited to those parts which could pass completely through the tool head. The past year, therefore, witnessed the development of a down-stroke model which handles not only all classes of work produced on the earlier model but also work which will not pass through the tool head because some part of the gear is larger than the part on which the teeth are cut. A general view of this machine is shown in Fig. 10, and resembles a vertical shaper or slotting machine in appearance and operation. The principal units are the tool head, which is practically identical to that of the up-stroke machine, and a ram carrying a blank supporting arbor. Mechanisms are provided for feeding the cutting tools into depth gradually and indexing the gear being cut by a space equal to one tooth at every stroke of the ram.

When one arbor of gears has been completed, the arbor is removed and an arbor loaded with blanks is inserted in its place. Changing of arbors consists of stopping the machine and elevating the ram to provide extra working clearance so that the arbor may be dropped down and removed. The new arbor then is placed in the spindle, fastened in place and the ram lowered. Included in the work produced by the machine are internal gears, internal splines, external custer gears, and gears in which the teeth terminate near a shoulder, etc. The entire cycle of motions composing the tooth cutting operation being automatic, the operator can control more than one machine.

Radical Development in Saws

No discussion of this nature would be complete without some mention of the development of metal-cutting saws. A number of new designs were introduced during the year and included saws of both the hack saw and band saw types. It is now possible to perform many angular and intricate cuts by this method. By such improvement this type of equipment advances itself to the machine tool class, and deserves careful consideration in the performance of certain production operations. The products of the new machines bear little semblance to those of their crude predecessors.

Functions Similar to Shaper

In the accompanying illustration, Fig. 7, is shown one of the shaping saws which has greatly extended the usefulness for this kind of machine. To permit the blade to be placed in proper tension without danger of distorting the bearings, the saw blade is carried in a four-sided frame. This frame is reciprocated by a crank and connecting rod arrangement, the motion being such that during the cutting stroke, the connecting rod is parallel approximately with the line of travel of the blade, thereby resulting in a direct pull. By means of a pump and reservoir, a coolant is supplied to the blade. The saw has a capacity for work 6¾ inches square and takes strokes from 10 to 14 inches. Operating speeds permit 132, 85 and 50 strokes per minute. To facilitate angle cutting operations, a fixture is arranged on which the work may be clamped to either the vertical or horizontal face. Another fixture of notable mention is a cross feed mechanism which is fastened to the saw table. Work may be placed in the fixture and fed transversely under the reciprocating saw blade which functions much the same as a shaper tool.

A number of machine attachments were developed during the year, the bulk of which had for their purpose the performing of some operation to make the machine on which it was installed move automatic and, therefore, more productive. The desire of tool builders obviously is to so design their machines that production depends to a lessening degree upon speed and skill of human labor.

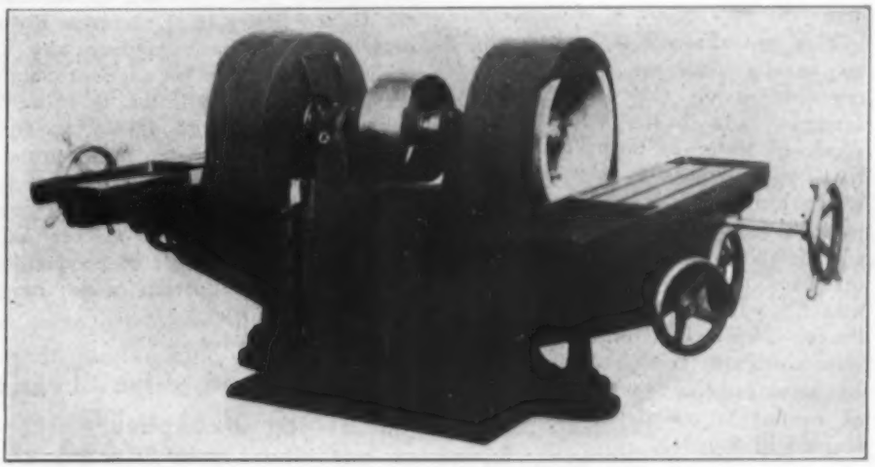

FIG. 11—TWO MEN CAN WORK SIMULTANEOUSLY ON A DOUBLE HEAD SURFACE GRINDING MACHINE OF THIS TYPE

Where We Stand in the World Market

(*Concluded from Page 35*)

tish commerce in iron and steel should be disassociated from British production. The machinery of British commerce is as complete and efficient as that of the American mills and furnaces. In a certain British directory, there are listed 1200 well established iron and steel export houses in the United Kingdom. It is doubtful if there are now 120 such firms in the United States. Moreover the British merchants specialize. In addition to the perhaps 300 large firms which trade all around the world, there are scores which deal only with India, the Baltic, the Mediterranean, Africa, or the Far East, as the case may be. There is an export house in London which deals exclusively with the Falkland islands.

This specialization is backed up by an equally complete and specialized organization on the part of British foreign trade banks and shipping services. Naturally the result is ability to scoop in trade. In addition to that which is indicated in the board of trade returns, we find in England a considerable invisible foreign trade in iron and steel. By this is meant, purchases by British merchants in Belgium or Germany for sale in Egypt, India, or China. Such commerce swells the export statistics of continental countries but the toll is paid in London.

There is nothing wonderful about all this. It is only the result of intelligent specialization along one particular line for a good many years. Such a foreign trade organization could and perhaps some day will be duplicated in a large measure by the United States. Internally American commerce is highly developed. It has harnessed forces, such as advertising, which are but little used as yet in foreign commerce. Another place where the American merchant in the domestic field stands high is in his appreciation of the value of service and good will, and his readiness to look at questions from the customer's standpoint.

Unfortunately American export trade suffered in just this particular during the war, through the entrance into the business of inexperienced and unscrupulous persons. The South American dealer who imported several hundred reels of "good" American barb wire and later discovered through the angry protests of his customers that it was nothing but odds and ends, almost scrap, is not likely to forget his experience immediately. Nor is the Englishman whose shipment of pipe arrived a mass of rust through several weeks' immersion in the leaky bilge of a shipping board freighter while she nosed all around the coast from New York to Galveston looking for enough cargo to essay the voyage to Europe. These incidents are true and there have been others. It will take some time to live down the feeling which some of these affairs have produced. But it is easy to overrate the effect of such unfortunate occurrences. They are not typical of American business, which on the whole, one may be so bold as to state, has higher standards than those of many European countries.

The trend of international competition in iron and steel at the present time tends to strengthen the position of the British export merchant, with the German a fairly strong second and the United States in third place. Business in general is expanding, and in typical American fields such as South America, Japan and China, the United States is making a good showing. But throughout 1923 export trade probably will be developed largely at a sacrifice, on account of the strong condition of the home market and the continued high cost of production in America compared with most European countries.

Normal Iron Ore Trade in Prospect

(*Concluded from Page 40*)

Ramsay, Mich. It is laying out streets for another community at Hamilton, just west of Hurley. This will house miners at the Montreal mine, where a new shaft has been sunk to a depth of 1000 feet and which ultimately will be sunk to a depth of 2500 feet. The Montreal now has four shafts. A new shaft also will be sunk at the Castile mine, replacing another there.

The Cleveland-Cliffs Iron Co., is building a new dam, about 10 miles long, on the Dead river, near Ishpeming, Mich., to increase its electric power capacity. Interests other than mining companies are developing hydroelectric power extensively throughout the Lake Superior district. The Cleveland-Cliffs shipped 250,000 tons from the Boeing mine in 1922. This was the first output from the mine, an open pit, Mesabi range.

Shipments were made by the Ford interests from the Imperial mine, Marquette range, formerly a Cleveland-Cliffs property. Extensive explorations are being made on land acquired by Henry Ford.

The Tod-Stambaugh Co. is building a washing plant at the Billings mine, Mesabi range, which will have a capacity for treating 150 tons of ore an hour, and will be in operation in the spring. The company is doing some additional stripping at the Biwabik, Dunwoody and Warren mines. Operations have been resumed at the Billings and Zimmerman mines. Before shutting down in 1921, the two last named mines were deepened, and ore now is being hoisted from the lower levels. The company shipped about 1,800,000 tons in 1922.

Pickands, Mather & Co. operated its mining properties at approximately 80 per cent in 1922. A number of its properties have been electrified. The Belgrade, a shaft mine, on the Mesabi range, closed down early in 1921, has been re-opened. Stripping is being done at the Scranton and Danube mines, Mesabi range. A new shaft is being sunk at the Bennett mine, Mesabi range. A steel headframe will be erected, and electric power supplied from a new plant.

The Shenango Furnace Co. has resumed operations at the Shenango mine, Mesabi range. Gasoline locomotives are employed in hauling ore cars at this mine, which is being worked underground and in the open pit. The pit is 300 feet deep. The McKinney Steel Co. installed new equipment at its Odgers and Tobin mine, Menominee range.

Section Thirty Mining Co. has started to sink a steel-lined five-compartment shaft to a depth of 1500 feet at its mine on the Vermillion range. This company shipped around 100,000 tons of silicious ore in 1922. Interest in this grade of ore is increasing in some quarters, but the proportion which it bears to the total still is very small. High silica ore is used in some instances by blast furnaces.

The Berkshire Mining Co. has built a magnetic separating plant for the treatment of its ore at the Berkshire mine, Mellen, Wis., and its output is being taken by the Charcoal Iron Co. of America.

At the Sagamore mine, Cuyuna range, John A. Savage & Co. continued hydraulic stripping whenever power was available. New shops have been completed, and the new crushing, drying and screening plant has been in operation since August. Stripping will continue during the winter. An option was taken on the Mace No. 3, Mesabi range, owned by Bennett & Longyear and the Great Northern Iron Ore Properties. Check drilling is being done, and a good size open-pit ore body of high grade wash bessemer ore is being defined. This mine is called the Draper Annex, being adjacent to the Draper.

Try New Ideas in Steel Industry

Engineers and Operators Seek To Improve Blast Furnace, Open-hearth and Fabricating Practice—Dawn of New Year Finds Industry Making Noteworthy Strides in Engineering Progress—New Tonnage Records

IN INDUSTRY, as in politics, a battle is raging between progressives and reactionaries. On one extreme is the radical, demanding a new order of things. Opposing him is the hide-bound conservative standing pat for a continuance of the old regime. Between the two is middle ground, from which vantage point one may safely judge the points of either school, and accept for himself, those which appear feasible.

Such is the situation in engineering circles of the iron and steel industry. Contact during the past year with metallurgists, engineers, operating men and plant executives has forced home the conclusion that it is not necessary to go to Washington to witness the clash of radical and conservative minds; Borahs and Lodges are active in almost every mill and furnace. They differ on methods of management, policies of selling and distribution, problems of operation, and principles of the design of plant and equipment. It is in this last named particular that they enjoy the widest latitude for the play of conflicting opinions.

For example, consider the design of open-hearth furnaces—a subject that has attracted more attention in 1922 than any other unit of iron or steel plant equipment. Furnaces reflecting innumerable shades of opinion may be found actually operating or in process of development. Perhaps the majority of operators cling to the conventional unit, prompted by instinct to shun new and untried ideas. At the same time, however, there is a constantly increasing school of those who recognize the need of improvement and who do not hesitate to spend time and money in attempts to develop their ideas.

The unusual activity in open-hearth development doubtless was inspired by the apparent early success of the McKune, Egler, Danforth, venturi-line and other similar systems. Up to the time these innovations appeared, comparatively little interest had been taken in the improvement of the regenerative furnace. Today there are few steelworks in the United States in which some idea calculated to improve combustion is not being tested.

Experimental work in the works, embracing studies of port design, air and gas volumes, refractories, reversing valve construction, water cooling, checker design, waste heat utilization, generation of gas, etc., is being augmented by laboratory tests under the supervision of engineers and metallurgists. Already the work of the past few years has borne fruit in the form of about a 20 per cent increase in the output of furnaces. With scores of experienced metallurgists and operators now seeking further improvements, it will not be surprising if a noteworthy advance is made in open-hearth practice in the near future.

In the absence of normal new construction in the blast furnace field, it is difficult to say what is transpiring in the development of furnace design. Engineers still are working toward improvements in gas cleaning processes, stove design, control equipment, and the handling and treatment of flue dust. Yet if a dozen new stacks were to be designed in the next few months, it is doubtful if they would differ in any important detail from the units built in 1920 and 1921.

The most important changes in the blast furnace industry are those of operating procedure rather than of design. This statement is confirmed by two engineering firms engaged in blast furnace work, whose views are expressed elsewhere in this issue.

It will be noted that stress is laid on the economies practiced by iron producers to offset the high fuel and transportation charges that enter into the cost of pig iron. The screening and sizing of coke, the use of scrap, the adoption of labor saving devices, and the tendency to increase the gross income from the sale of slag, surplus power, coke dust, etc., are indications of the pressure brought to bear on furnace operators by the existing economic conditions.

Important changes in rolling mill practice take place slowly; consequently the advance from year to year sometimes is imperceptible. During the last decade improvements in roll drives seem to have dominated all other phases of development, and in this respect 1922 was no exception.

Due largely to the increasing demand for automobile steels, much of the progress made during the past 12 months has been associated with the production of sheet and strip steel. Manufacturers of motor cars are demanding sheets of the highest quality, and in order to meet this need, producers are striving to improve mill practice. In some cases, methods that have proved satisfactory for ordinary sheets have been abandoned, and the practice of "loose" rolling, while undesirable from a tonnage standpoint, has been employed to insure higher quality.

The problem of producing high class drawing stock is receiving special attention in many mills, and a number of producers are spending large sums of money in experimental work.

One phase of the problem involves the mechanical treatment of steel. Modern methods of fabrication impose excessive strains on the metal and for this

reason the steelmaker must consider not only the requirements of the finished product, but also the necessary properties to withstand the punishment incidental to fabricating.

This point is well illustrated in the case of galvanized sheets. Not many years ago, eavestrough, down spouts, furnace pipe, etc. were formed by hand. The bending and seaming operations were performed slowly with little strain upon the material. Today this work is done on automatic machinery under high pressures and at an excessive rate of speed. To meet these new conditions the steel must possess certain properties and the galvanizing must be applied with special care. This mechanical hazard also affects the production of sheets, strip steel, bars and other products.

A change in the drive of cold-rolled strip reels have been noted in the application of electric motors operated by a generator driven from the last stand of rolls. A voltage regulator controlled by the armature current works across the resistance in the field of the motors and maintains this current constantly, so that the same pull is exerted on the strip at all times with a given setting. A somewhat similar device was installed during the year to drive the rod reels in a new wire plant. The electrical control is such that the reels follow the speed of the last stand almost exactly, notwithstanding the fact that at times the speed is 3200 feet per minute.

Progress continues to be made in the application of electric drive to large rolling mills. A double unit motor rated at 4,000 horsepower continuously at 80 revolutions per minute is being applied to a 30-inch reversing universal skelp mill. Other installations of motors are being made in connection with bar, structural, rod, strip, plate, tin and tube mills. In a number of instances, continuous mills have been fitted with motor drives, an individual motor being used for each separate stand. Introduction of the individual motors, particularly on the finishing stands enables the operator to adjust the speed relation between stands. Due to the flat regulation of these motors, the speed is being maintained regardless of the load.

By-Product Coke Ovens Improved

Much has been accomplished during the past year in the improvement of equipment for by-product coke ovens. Perhaps the most significant advance has been in the development of a new type of oven which shows surprising results when compared with ovens previously built by the same company. The advance in the design of by-product coke ovens in respect to tonnage is revealed in a striking manner by a comparison of the performance of the original units installed at Clairton with the expected results from the new ovens to be added to the same plant. When the Clairton by-product plant was installed, 768 ovens were designed to coke approximately 13,000 tons of coal per day. It is expected that the 366 ovens of the new type, now being erected, will carbonize about 8500 tons daily. This means that in the course of six years, American ovens have been improved so that the efficiency of carbonization has been increased approximately 36 per cent.

Another significant tendency in the by-product field is indicated by the ability of oven engineers to coke coals of a wide range of analyses. In addition to a number of middle western coals, American coke ovens in 1922 successfully coked several brands of English coals in a considerably shorter time than is consumed in the best English ovens.

Owing to recent changes in open-hearth practice and to the growing use of higher temperatures in many metallurgical operations, there is a serious need for improvement in refractories. As a result refractory manufacturers and others are giving attention to greater uniformity of brick, higher melting points, greater resistance to thermal shock, stability of volume and resistance to the action of slag. Considerable research and routine laboratory work is being performed in an endeavor to improve refractories, but it is doubtful if definite results may be expected for some months.

The past year in the foundry industry was marked by the change in specifications for several types of castings. In the case of malleable cast iron, the tensile strength and elongation were increased and in the case of steel castings, the tensile strength was ignored, but more importance was attached to the yield point and elongation. Several other changes in the specifications of castings also were made, all of them reflecting the tendency to improve the quality of the product. This improvement has been effected largely by the substitution of scientific control for hit-and-miss methods in the foundry. Rigid inspection, coupled with systematic testing of metal and product, is being used effectively. Another factor tending toward improved practice is the inauguration of co-operative research as carried on by several foundry groups and associations.

What Are Significant Points of Blast Furnace Development?

ASKED what they consider are the most significant features in the recent development of blast furnaces, the engineers of two firms who have been engaged in most of the blast furnace work of the past few years, gave replies indicating that in practice, rather than in design, there are a number of important tendencies.

Engineers with Arthur G. McKee & Co., Cleveland, give their views on the question in substance as follows:

1. *The efforts on the part of operators to reduce costs to offset the abnormal charges for fuel and transportation. This is being accomplished by the substitution of stock handling equipment for hand filling methods, screening of coke and sale of breeze, sale of slag and surplus power, concentrating control of furnace, etc.*
2. *Increased tonnage output of furnaces and the tendency to use scrap.*

Freyn, Brassert & Co., Chicago, consider the following as the most significant features of development:

1. *The growing use of scrap and the universal increased tonnage rate of American blast furnaces.*
2. *The recent advance in by-product coke oven design and practice, attempts to devise experimental means for the determination of the qualities of blast furnace coke, particularly its combustibility, and the optional and forced use of inferior grade or high volatile coking coals.*
3. *The adoption of the low steep bosh and wide hearth in southern blast furnace practice.*
4. *The establishment of use of sintered magnetic concentrates at Adirondack, Jersey and Pennsylvania furnaces in large proportions of the burden.*
5. *The successful establishment of sales of surplus electric power at sustained rate of output to public service companies from isolated blast furnace units.*
6. *The reduction of unskilled and semi-skilled labor by centralization of responsibility upon fewer but more highly skilled key men and by introduction of labor saving devices.*
7. *The growing recognition of the advantages of the closed type and covered hot metal ladle.*
8. *The elimination of the flue dust nuisance at blast furnace plants.*
9. *The development of control equipment, particularly in connection with the utilization of surplus gas.*

Ironmaking Progresses in 1922

Increased Use of Heavy Scrap, General Adoption of Rating Plan, Reduction in Use of Hand Labor, and Exceptional Production Records Are Among Signs of Advance in Blast Furnace Practice

BY RALPH HAYES SWEETSER

PROGRESS in blast furnace practice during the year has been more pronounced than for any other similar period since the building of furnaces over 90 feet in height. There has been an awakened interest in blast furnace management, bringing about a greatly increased production per furnace with a more than corresponding reduction in the hours of labor per ton of pig iron. Blast furnaces designed to make certain tonnages have been making 20 to 25 per cent more pig iron than was estimated by the engineers and builders.

Enrichment of the ore mixtures has more than offset the decreasing iron contents of the available iron ores; better preparation of coke and flux stone and more attention to the refinements of blast furnace practice have all helped to advance the art of making pig iron. Outside of the constant aim of blast furnace men to break tonnage records and decrease the cost, there have been two outstanding factors responsible for this progress in blast furnace practice, namely:

First—The positive need of greater production per stack because of the enormous unit cost of blast furnace plants erected during the past five years as compared with the cost of blast furnace construction before the war; and

Second—The recognition of a workable rule for determining the capacity of a blast furnace.

Enrichment of the Ore Mixture

With the decreasing iron contents of natural ores, especially from the Lake region, it has become common practice to "sweeten" the mixture with scrap or with rich by-products, such as high grade sinter. This good practice frequently has been spoken of as "making a cupola out of the blast furnace," and furnace managers have actually apologized for their big outputs because they used 10 to 20 per cent of scrap. There is no need for such apologies, and there is no need for making special arrangements for keeping separate cost sheets for the pig iron made from the ore mixture and for the pig iron made from the scrap in the same furnace at the same time. There is no such distinction. The iron blast furnace is a smelter and not a cupola, and pig iron is made by a smelting process and not a melting process.

Even if 20 per cent of heavy scrap should be used with 80 per cent of iron ore running 49 per cent in iron (natural), the average iron contents would be less than the "choice selection" described by Arnold Reese in his paper on "Notes on Six Months' Working of Dover Furnace, Canal Dover," which appeared in Vol. XXVII of the American Institute of Mining and Metallurgical Engineers. In the days to which he referred a mixture of 59 to 61 per cent iron contents was not unusual; and even today some magnetic ore mixtures can be as rich.

Increased Use of Heavy Scrap

In addition to the use of iron and steel scrap and by-products with heavy iron contents as part of the regular burden of the furnace, there has been an increasing amount of heavy scrap and miscellaneous small scrap melted in the pouring ladles and direct metal ladles at blast furnaces, by making use of the initial heat of the iron as it comes out of the furnace.

This practice can be carried on to a great extent only when the furnace is in good working condition, and it may be necessary to have a little extra silicon in the iron before it can be used for melting up low-silicon or low-carbon scrap. The usual practice is to put heavy scrap in the bottom of the ladles as soon as they are empty so that the scrap gradually will be heated before the molten iron is poured in at the next cast. Even sheet iron, old wire ropes and light scrap can be re-melted if properly weighted down with heavy scrap.

In the same line with this practice is the elimination of heavy skulls from pouring ladles and direct metal ladles. At one time the ladles used between the blast furnace and the pig casting machine were taken out of service as soon as they became heavily skulled, and many thousands of tons of pig metal were put into scrap of very low value, instead of being put into pig iron. Usually these big skulls were shipped to some blasting company and broken up into heavy melting scrap. The practice now gaining favor of handling ladles at pig machines entirely prevents the formation of these skulls, and ladles are used for several hundred casts, and are taken out of service only when the lining becomes too thin for safety.

Rule for Furnace Capacity

The need of an accepted workable rule for the determination of the capacity of a blast furnace was very forcibly brought to the attention of blast furnace men when they appeared before J. Leonard Replogle, steel director, at Washington in September, 1918, and heard the various explanations as to why their production had not come up to their "rated capacity." At that time there was no recognized rule for blast furnace "rated capacity."

The past year has witnessed the general acceptance of the rule worked out and published by the Southern Ohio Pig Iron and Coke association in August, 1920. This rule is based on the fact that furnace capacity must be expressed in terms of pounds of coke burned in 24 hours. The "base" coke adopted contains 89 per cent fixed carbon, less than 1 per cent sulphur, 9 to 10 per cent ash, and 1 to 2 per cent volatile matter. The structure of this coke is "tough, but not dense or fragile, free from breeze."

The rule for furnace capacity is: "The furnace should burn 60 pounds of coke for each cubic foot of working volume in 24 hours." The "working volume" is the volume from center line of tuyeres to two feet below the bell when closed.

One advantage of this rule is that it works; even furnacemen who criticized at first are getting the rated tonnages from their furnaces.

In the past we have used the term "manufacture of pig iron," but with the modern blast furnace this expression is now a misnomer, because the hand of man no longer touches the raw material or finished product. It would be more appropriate to call it the "making of pig iron." The handling of ore with D-handled shovels and ore buggies; the forking of coke and limestone and wheeling the bug-

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gies onto a vertical skip hoist; the "snapping" of cinder with hooks and forks on a cinder yard; and the carrying of each pig of iron from a pig bed onto iron trucks or into railroad cars; and other laborious hand operations are fast becoming obsolete. Some of this work was too hard for an ordinary man, and with the advent of furnaces making big tonnages it was almost impossible to get enough men of the necessary physical requirements to handle all the ore, coke and limestone going into the furnace and to handle the pig iron and slag coming out. These hand methods now are in use only at the smaller furnaces; and naturally the operating costs are high.

The increasing use of oxygen around blast furnaces has helped to reduce the number of men on each shift, because it is not necessary to have so many men on hand for emergencies such as a "lost" iron notch or a "frozen" cinder notch. Much hard work with sledge and bar has been avoided by the use of compressed oxygen.

The passing of hand-labor at blast furnaces has been gradual, and in many cases there has been a "hang-over' of excess manpower, which often follows the introduction of mechanical means for doing hand work. There have been many cases where too many men have been employed. The depression of 1921-1922 helped to call attention to wasteful practices. The ingenuity of the men themselves helped to do away with unnecessary work; even a lazy man sometimes really invents a good way to get rid of work.

The recent scarcity of unskilled labor has made it more imperative than ever for the blast furnace managers to devise means of eliminating hand labor, and many ingenious schedules have been worked out with the idea of reducing the number of men around the furnace. This has had a good cumulative effect and has attracted a better class of men into blast furnace work, resulting in better working conditions and higher wages. The man-hours of labor per ton of pig iron have been greatly reduced since the Armistice by increased output and by the actual elimination of the necessity of hand-labor.

This is the blast furnace man's answer to the shortage of unskilled labor, and the tendency will now be toward the elimination of every possible wasteful practice brought about by the survival of customs that go back as far as the old charcoal furnaces, where everything was handled by manpower.

Research Work

There are still several unsolved problems relating to the action and reactions inside the blast furnace, and comparatively little has been added to the solution of them since the days of Sir Lowthian Bell. There have been independent investigations regarding such factors as the combustibility of coke, the theory of blast furnace slags, the viscosity of slags, the descent of the charge, the temperature inside the blast furnace, and the use of oxygen for the blast. As yet none of these investigations has satisfactorily solved the question as to the exact kind of coke necessary for the best results inside of a blast furnace, and as far as we know no one has yet found out just how to put the exact amount of carbon into pig iron; and, furthermore, as far as we have been able to find out very few of the users of pig iron know how much carbon they ought to have.

There are some conditions that have been accepted as satisfactory, and to which no special attention has been given. One of these important points is the effect of sulphur in blast furnace coke. For many years the standard of "sulphur 1 per cent and under" has been unquestioned; but now the extra cost to the furnace for even this much sulphur is being investigated.

There has been published this past year interesting facts concerning the bad effects of small amounts of lead and zinc in blast furnace mixtures. Very few if any of the lake ores contain lead, zinc or arsenic, and most of these deleterious elements encountered are found in iron-bearing by-products and in foreign ores. Zinc is found also in certain limestones. Although the bad effect of zinc on blast furnace linings and shells has been known to some blast furnace men for several years, yet the effect of a very small percentage in the mixture has never been especially guarded against, but several severe accidents to blast furnace shells can be blamed against this quietly acting metal.

There is, however, at the present time increased activity in the research work of blast furnace practice. The United States bureau of mines is especially active in this work, and has already made some discoveries that promise to have important bearing on the blast furnace practice of the near future. Experiments for the determination of the temperature of the molten iron and of the molten slag as they run from the blast furnace have been conducted by others during the past year. Much work regarding the combustibility of coke has been, and is now being done.

Raise Standards of Foundry Practice

BY H. E. DILLER

HIGHER demands by the users of castings were embodied during the year in radical changes to standard specifications adopted as tentative by the American Society for Testing Materials, and the promulgation of new specifications calling for higher physical properties. The minimum demands for tensile strength in malleable-iron castings was raised from 45,000 to 50,000 pounds per square inch and the elongation in 2 inches from 7.5 per cent to 10 per cent. A specification for steel castings for railroad work in which no tensile strength is specified, but in which the yield point together with the elongation is used to determine the acceptability of the castings, was also adopted as tentative by the society. Tentative specifications for high-test cast iron, or semisteel, which call for a tensile strength of 28,000 pounds per square inch and a transverse strength, measured on the standard arbitration test bar, of 3800 pounds were adopted. This is the first time a specification for this grade of iron has been adopted by the testing society.

In the malleable branch of the foundry industry the year was marked by an effort to more thoroughly utilize electricity as a heating agent both in the melting and in the annealing operations. One manufacturer of ovens made extensive tests to demonstrate the advantages of annealing with electricity but has not succeeded in introducing the annealing oven in any foundry. On the other hand one of the malleable shops in the Middle West is making extensive tests to determine the practicability of the electric furnace for melting malleable iron. Chemical control of the melting operation and the composition of the white iron to insure that the metal will meet the requirements of the higher specifications is being secured

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in one or two cases by preliminary analyses of the metal. This enables the melter to furnish iron of the required analyses by the addition of carbon or silicon as the quantative need is shown by the analyses, or by burning out more of these elements if the test indicates either of them are too high.

Methods of testing sand for bond and fineness have been developed and adopted in a number of foundries as regular practice to control the condition of the sand used for facing. This is especially true in the steel foundry where the control of the sand has not only increased the percentage of good castings made but has enabled the use of a larger percentage of used sand. The steel foundry also has been benefited by improvements in design of the open-hearth furnace, especially of the ports, to give a blowpipe effect to the flame and thus decrease the time required to make a heat. A process also has been developed for making steel from scrap steel without the use of pig iron. This is accomplished by the use of ferrosilicon, spiegeleisen, and carbon.

Ageing of gray-iron castings has always been an expense to the manufacturer of automobiles who formerly allowed castings to stand as much as six months before machining them that the internal strains might be relieved to prevent the castings from springing out of round when machined. This practice still is in vogue in many of the foundries making cylinders and pistons for gasoline engines, but some shops have adopted a process of ageing by passing the castings through a furnace to heat them to about 550 degrees Cent., or a little higher. Thus in a few hours the effect of months of ageing are secured. Annealing at a somewhat higher heat in a con- for certain gray-iron castings to tinuous furnace has also been adopted make them more uniform for machining and enable the rate of machining to be increased.

Officers Are Announced

Pittsburgh, Jan. 3.—Officers of the newly incorporated Jones & Laughlin Steel Corp., Pittsburgh, which succeeds the Jones & Laughlin Steel Co., have been announced as follows: Chairman of the board, B. F. Jones; president, William Larimer Jones; vice presidents, Willis L. King, G. M. Laughlin, W. C. Moreland and Charles Fisher and S. E. Hackett; secretary, B. F. Jones III and treasurer, J. C. Watson. In addition, W. J. Creighton has been made assistant secretary and F. D. Cummings, F. M. Harbison and J. S. Brown, assistant treasurers.

New Secretary

Of Iron and Steel Institute in Person of E. A. S. Clarke Named

E. A. S. Clarke's appointment as secretary of the American Iron and Steel institute, announced Dec. 28 by E. H. Gary, president of the institute, is regarded generally in the steel industry as having the effect automatically of elevating the importance of the secretary's office. For many years, Mr. Clarke as president of the Lackawanna Steel Co. and later as president of the Consolidated Steel Corp., has been recognized as one of the leading figures of the industry. It is felt that as secretary,

E. A. S. CLARKE

he will be able to expand the work of the institute and make it of maximum usefulness.

As secretary of the institute's committee on steel and steel products, and as a member of various subcommittees of this parent committee, Mr. Clarke performed distinguished services for the industry during the war. As secretary of the subcommittee on differentials, which compiled the official booklet of government prices during the war, he worked practically night and day over a long period.

As secretary of the institute, Mr. Clarke succeeds James T. McCleary. The latter, a prominent educator, and a member of congress for 14 years, and assistant postmaster general under President Roosevelt was elected secretary of the institute in 1911, and served in that capacity until early in 1920. He succeeded W. J. Filbert.

Mr. Clarke, who has been a director of the institute since its organization, was born in Canada in 1862. Following his graduation from Harvard university in 1884, he entered the laboratory of the Spang Steel & Iron Co., Sharpsburg, Pa. In 1885 he went with the Union Steel Co., Chicago. In 1890 he became assistant superintendent of the Union Works of the Illinois Steel Co. In 1891 was appointed assistant general superintendent of the South Works, and in 1899, became general manager of the Illinois Steel Co. He resigned and in 1900 became general manager of manufacturing for the Deering Harvester Co. In 1903 he was appointed to the same position in the International Harvester Co. Mr. Clarke became president of the Lackawanna Steel Co. in 1904. He served in this capacity until he resigned to become president of the Consolidated Steel Corp., which now is being liquidated.

10,050 Cars Placed

Chicago, Jan. 2.—Orders for 10,050 railroad cars have been placed with builders in the Chicago district during the past week. These indicate the end of the year has not caused a lull in demand. In addition, inquiries for 2570 freight cars and 96 passenger cars have come out. An outstanding locomotive order calls for 60 for the Chicago, Burlington & Quincy railroad, the business going to the Baldwin Locomotive Works. New awards and inquiries follow:

CAR ORDERS PLACED

Baltimore & Ohio railroad, 500 hoppers each to the Standard Steel Car Co., Ralston Steel Car Co. and Youngstown Steel Car Co.; 1000 hoppers to the American Car & Foundry Co. and 1500 hoppers to the Pressed Steel Car Co.

Great Northern railroad, 750 ore cars each to the Pressed Steel Car Co. and the Cambria Steel Co.

Southern Pacific railroad, 3700 box cars to the Standard Steel Car Co., 550 stock cars to the Pullman Co., 350 flats to the Ralston Steel Car Co., 300 flats and 100 cabooses to its own shops.

CAR ORDERS PENDING

United Fruit Express, 100 refrigerators, bids asked.

Baltimore & Ohio railroad, 100 gondolas, bids asked.

Denver & Rio Grande railroad, 350 gondolas, bids asked.

Great Northern railroad, 1000 box cars, bids asked.

Elgin, Joliet & Eastern railroad, 100 gondolas, bids asked.

Hoover Sees Trade Gain

Washington, Jan. 2.—At the close of 1922 there were no serious obstacles in sight which would hinder further business improvement during the early part of the new year, says Secretary of Commerce Herbert Hoover, in a review and forecast of business. Production of manufactured commodities in 1922 was about 50 per cent greater than in 1921, the statement declares. Iron and steel operations increased 70 per cent; automobile production 50 per cent; building construction, 50 per cent; coke, 40 per cent; and nonferrous metals from 50 to 95 per cent. Prices to the farmer increased 17 per cent during 1922.

Steelmakers Strive for Higher Open-Hearth Efficiency

BY E. L. SHANER

STEELMAKING is in the grip of an enthusiastic campaign of technical development. The past year has witnessed a disposition on the part of many engineers, metallurgists and operators to study the principles of combustion and to apply them to the problems of open-hearth furnace practice. While attention generally has been focused on the design of ports, other factors, such as water cooling, construction of checkers, design of reversing valves, utilization of waste heat boilers, etc., have not been neglected. New ideas, covering many phases of furnace design and operation are being tried out, and it will be surprising if the present wave of experimental work does not result in significant progress.

But while these investigations have been going on, steelmakers have not hesitated to make extensive improvements along conventional lines. In checking the repair work done in the open-hearth departments of two large producers, one finds that a rather imposing amount of money has been spent on alterations to existing equipment with a view of making it capable of handling greater tonnage. A number of 125-ton ladle cranes have replaced those of smaller capacity; crane runways on both sides of the furnaces have been strengthened in several plants; charging floors have been reinforced and heavier charging machines installed; and gas producers have been modernized and gas mains rebuilt or extended. A refinement worthy of note is reflected by the increasing number of electric door lifts now being installed on old furnaces.

Another indication of the new trend of thought among steelmakers is found in the contributions during the past year to the literature of steelmaking. For the outstanding technical paper on the open-hearth, presented in 1922, the industry is indebted to Fred Clements, whose discussion of the subject before the iron and steel insitute, received more than usual attention among British steelmakers.

Show Trend of Development

Mr. Clements has analyzed the important problems in a carefully worked out sequence, which already has served as a model for other papers treating the same subject. Another valuable contribution is the account of an investigation on the thermal efficiency and heat balance of an open-hearth unit of the Illinois Steel Co., prepared by C. L. Kinney Jr. and G. R. McDermott for presentation at the October meeting of the American Iron and Steel institute. Herbert F. Miller's paper on fuel utilization and that of William C. Bulmer on reversing valve design, presented at institute meetings, also are timely discussions of open-hearth problems. Willis McKee summarizes the trend of development of furnace design in a paper prepared for the American Foundrymen's association, while a statement of the commercial, economic and technical status of some of the new combustion systems is well stated by E. J. McDonnell in a paper read before the Pittsburgh Foundrymen's association.

These papers show that steel makers are thinking along lines of higher fuel economy, greater output per unit, and improved product. Thus far, the results of the designs introduced during the past few years are most noticeable in tonnage and economy. The generally accepted advantage for furnaces conforming to the Egler, McKune and Venturi-line designs is an increased output of 20 per cent with a decrease in fuel consumption of 10 per cent.

Many operators find it difficult to place a satisfactory interpretation on these figures. The improved combustion of furnaces of the blow-pipe principle increases the amount of gas to be handled, and therefore imposes certain requirements on the gas

handling apparatus. Air checker chambers and brickwork in the furnaces must be tighter than in the ordinary furnace in order to take care of air under fan pressure. Moreover, a higher standard of intelligence among the workmen and in the supervision is required than in the case of the conventional furnace. Until experience determines how much the tangible advantages of the blow-pipe principle overweigh these and other considerations, there will be doubt as to the true significance of this seemingly important development. In the meantime the results thus far obtained have done much to spur investigators to a renewed study of port design.

Several unusual production records have been announced during the year. A furnace in the plant of the Brier Hill Steel Co., which burns natural gas and is equipped with blow-torch ports, made 9111 tons of high grade basic steel in 31 days. The highest output in an ordinary furnace, but with a charge containing a greater percentage of hot metal, had been 6344 tons.

Open hearths not equipped in accordance with new designs also have established noteworthy records. No. 4, furnace of the Weirton Steel Co. produced 7857 tons, and the entire plant of seven units produced 49,118 tons of ingots in a month. A number of furnaces operated by the United States Steel Corp., with modified port and draft arrangement, also are credited with remarkable tonnage performances.

An interesting comparison of thermal efficiencies covering a period of 16 years was presented by C. L. Kinney Jr., and G. R. McDermott in a paper previously mentioned in this article. Tests on a furnace which gradually had been altered to conform to the current ideas of design showed that the number of pounds of coal per ton of steel was reduced from 600 in 1912, to 548 in 1914, to 477 in 1922. A number of open-hearth authorities claim that the amount of coal per ton of steel has averaged as low as 350 pounds, but such statements, lacking data on the grade of coal, method of calculating, etc., are of no value for purposes of comparison. However, it is clear that furnacemen are working toward increased economy.

Design's Six-Way Reversing Valve

The design of reversing valves is claiming the attention of several investigators. One new model is virtually a self-contained six-way valve designed so that all gas mains are overhead and so that only one gas connection and one valve are required to a furnace. The valve is unseated, swung through a 120-degree arc and seated by means of a motor-driven crank and cam arrangement. The moving parts are pivoted on ball bearings and counterweighted so that in an emergency or when burning out flues through the valve, one man can operate the mechanism by hand. From the standpoint of simplicity, minimum drop in gas pressure and temperature, and low resistance to incoming gases, etc., the design seems to compare favorably with that of other reversing valves.

Fuel and transportation problems influenced open-hearth practice in some localities during the year. The supply of good gas producer coal was interrupted frequently and in a number of cases fairly large plants temporarily adopted oil. Most of these furnaces now are using gas, but in several rare instances the liquid fuel has been retained, probably with the idea of using it regularly. In spite of the uncertainty of coal shipments, producer gas still is the dominant open-hearth fuel in steelworks. In foundries, however, where melting schedules are subject to wide variations, oil is used more extensively than gas.

Inability of steelmakers to depend on the prompt delivery of materials accentuated the practice of making steel in the open-hearth without using pig iron. Several companies have been doing this for a number of years, but the practice received more than usual attention during the strike period owing to the remarkable success enjoyed by one company employing the process for producing steel plates.

An open-hearth furnace equipped in accordance with Loftus designs. This unit has been in operation for several months and is representative of the efforts now being made to improve combustion in this type of furnace

Pressed Metal Methods Advance

Manufacturers Take Initiative in Re-Development Work—Progress Is Made in Extrusion Process, Particularly in Field of Non-Ferrous Metals—Use of Power Presses for Making Forgings Spreads

BY O. P. HATTON

SOMEWHAT too generally for purposes of analysis, members of the pressed metal industry respond to the question "What progress has been made during 1922?" with indefinite replies. However, there is a cheerfully optimistic air about the informants that belies the apparently pessimistic character of their answers and prompted this persistent investigator to ask leading questions. Almost universally there appears to have been a real and important advance, which is reflected more in the somewhat intangible field of engineering accomplishment than in any visible increase in volume of business.

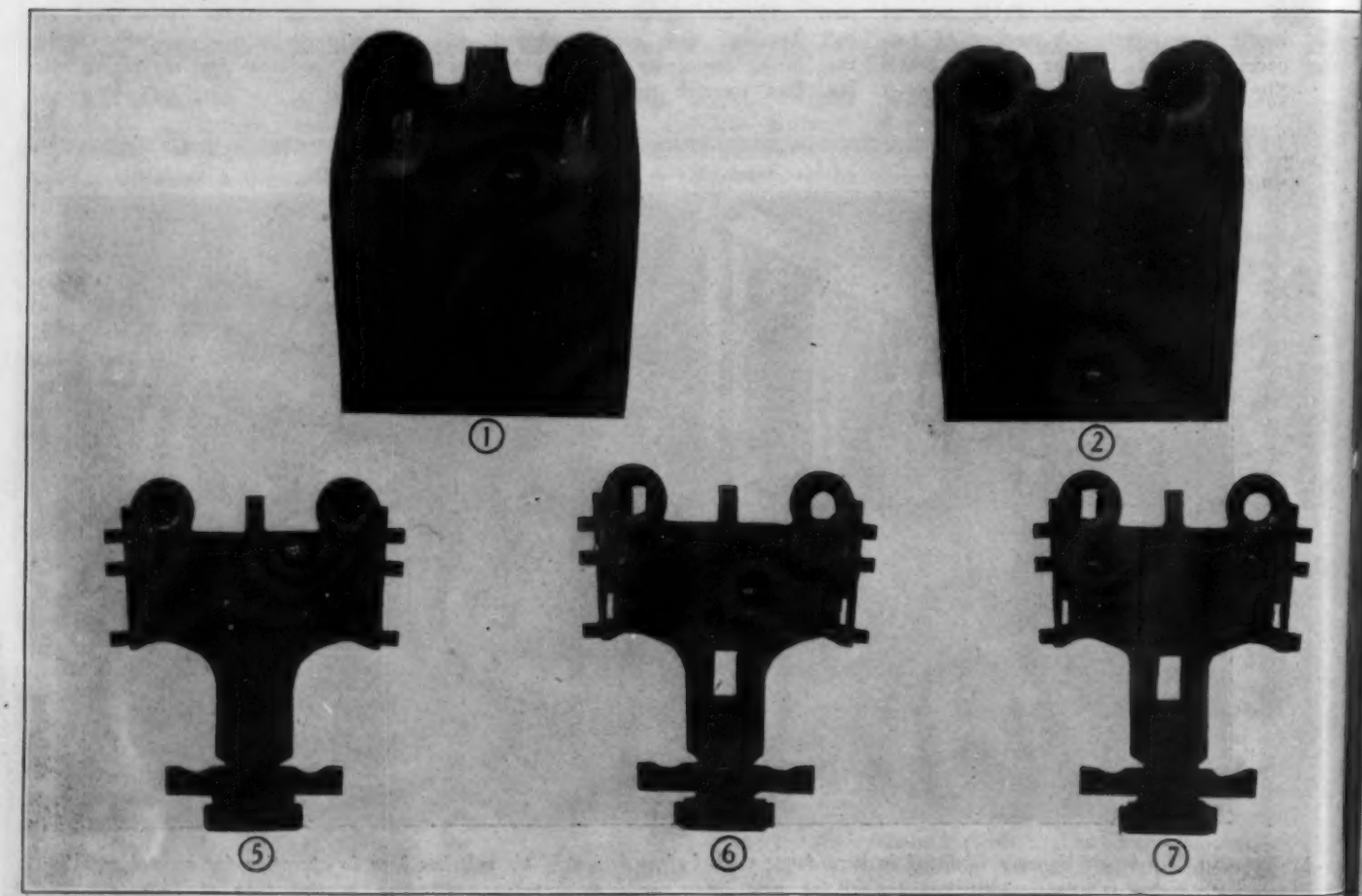
The year, as a whole, has witnessed a decided trend toward trade extension into new and previously unexplored fields. During the war period, much of the development of the pressed metal industry was due to the initiative and enterprise of users of pressed metal products. Manufacturers responded to this pressure from without by assisting in every way in the development of new methods. This reciprocal arrangement was a factor in the parallel progress in the automobile and pressed metal industries. Each owes to the other a tremendous debt, mutually canceling in the co-operation that has meant much to both.

Today a very different attitude toward manufacture is evident. No product involving quantity usage is too small or too large to avoid scrutiny by the alert engineers engaged in redevelopment work.

The entire industry has been generally active in redevelopment work. In the main, effort along this line has been directed toward reducing cost, since present conditions make the approach by this avenue to new business the easiest. In many cases, however, there is an accompaniment of substantial improvement in quality.

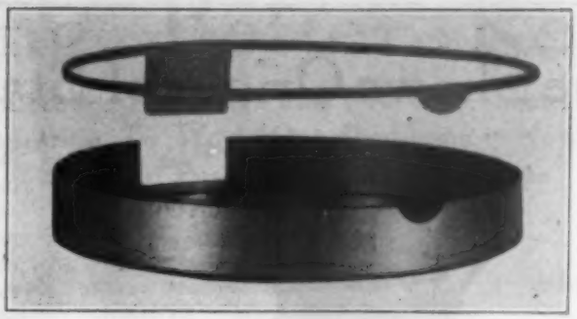
The tendency toward equipment capable of producing larger and larger articles has continued as in the past. Power presses with shafts up to 21 inches in diameter are projected if not already in operation.

The general revision of manufacturing processes with the object of lessening production costs has brought some companies utilizing pressed metal in connection with their products to the machinery builders' aid in the introduction of more economical layouts and methods. In this work there have been some important developments in automatic handling devices. Hitherto these have been developed chiefly in



TEN STEPS IN THE FABRICATION OF AN ALLOY TRACTOR SHOE SHOWING HOW AN EXCEEDINGLY TOUGH METAL BLANK BEING SHAPED ON POWER PRESS

units for the rapid production of small articles. The principle of automatic feeding and delivery is being applied now to units of larger capacity and may even be applied in the near future to those of the largest size. Certainly there is no reason to believe that power press builders have yet reached a limit either as to size or adaptability of the units they can produce. Among the interesting developments that have made substantial advance during the past year is that in the utilization of scrap from the production of large articles in the manufacture of smaller ones. The scrap problem has always been an important feature of the business and the ingenuity of die designers has been heavily taxed to reduce this to a minimum.

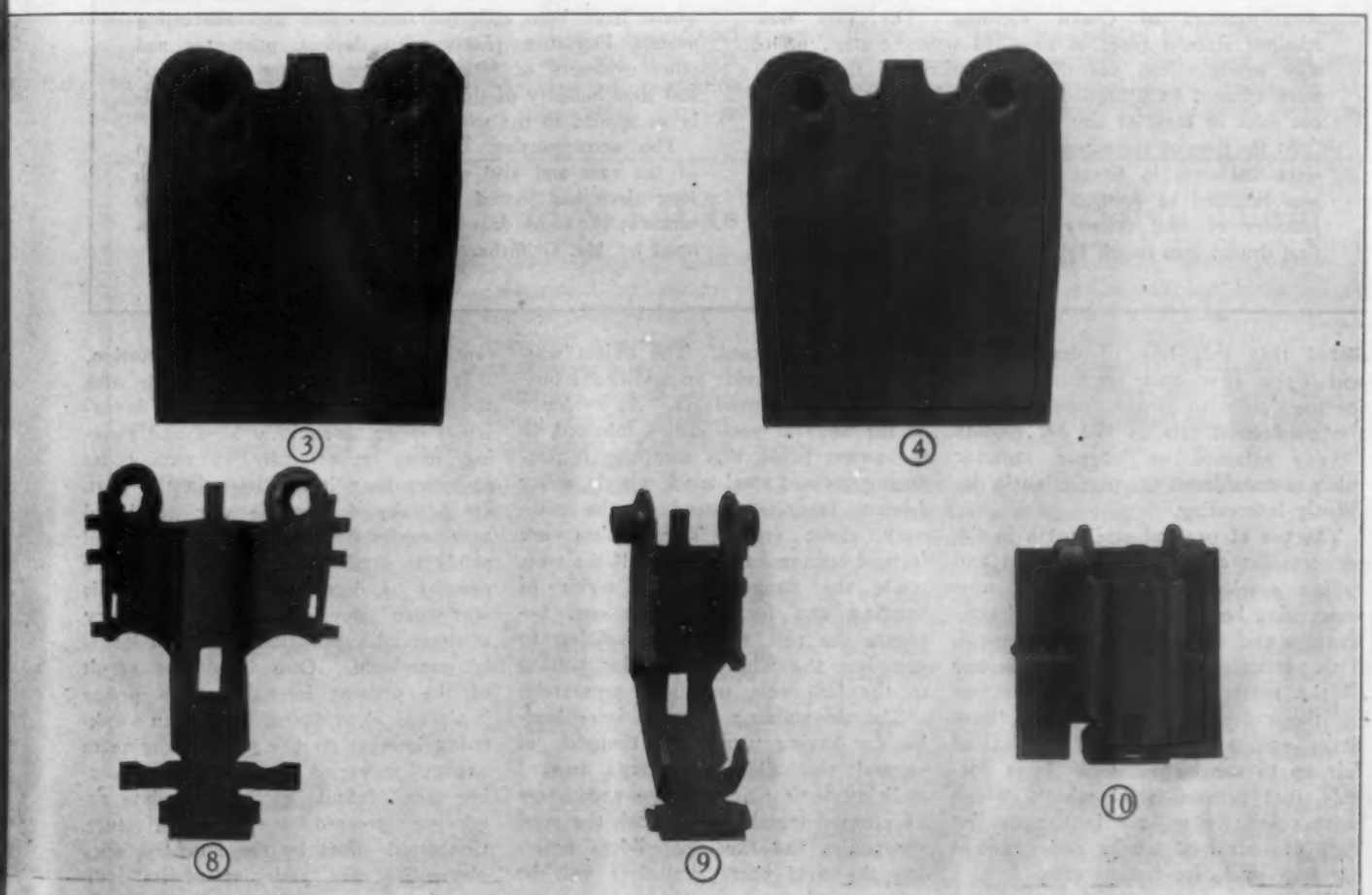


AN EXAMPLE OF CIRCULAR WORK PRODUCED ON A RECENTLY DEVELOPED FLAT EDGE TRIMMER

Economical advantage is now being seized in a systematic use of necessarily large scrap in the production of a variety of small parts. In a way, this is a case of by-product utilization since the value of scrap thus worked up is far greater than its sale value as mere scrap. Between the skill of the die designer in avoiding a high percentage of scrap production and that of the engineer in enhancing the value of what is unavoidable, the scrap problem is being reduced to a negligible factor.

During the year there has been notable progress in the stamping of hard steel alloys. Products subjected to severe abrasive wear in service, and therefore made from alloys, are being added to the list of pressed metal achievements. Scoops, shovels, conveyor buckets, and articles of similar character are being successfully drawn cold in some cases. Where the required depth of draw or some peculiarity of shape enforces it, hot drawing is employed. An interesting advance in the use of power presses in producing forgings is noted. Remarkable strides recently have been made in securing more rapid and economical production. Not only have forging companies developed this use of equipment belonging, in the past, distinctly to the pressed metal field, but other interests are adopting the method. Turbine blades are now made from press-forgings. Automobile manufacturers have within the year, transferred a considerable number of small and moderate-sized forgings to the power press. In a few instances press forgings of a considerable size are being made.

Extrusion of metals by the use of power presses is another development that in time may engage the attention of the industry, generally, as it now does that of a few firms. In recent months some important developments have been made in extruding zinc, such articles as battery cups, collapsible tubes and ordinary tubing being made from this metal. It is pre-



SHAPED BY SUCCESSIVE OPERATIONS TO THE FINISHED FORM SHOWN IN 10. MANY ARTICLES OF ALLOY STEEL NOW ARE —ILLUSTRATIONS BY COURTESY OF E. W. BLISS CO.

Historic Vase Shows Origin of Stamped Metal

WHAT is believed to be the first accredited specimen of the art of drawing and spinning iron and steel and therefore the forerunner of the drawing and stamping industry now registering such wonderful expansion in this country, has come into the possession of Stephen W. Tener, manager of the accident and pension department of the American Steel & Wire Co., Cleveland. This article is a small metal vase with handles standing 2½ inches high. It was made by Thomas Foxhall Griffiths, a British ironmaster of prominence of the middle of the last century, and was first exhibited by him at the Crystal Palace exposition conducted in London in 1851 under the auspices of Albert, royal consort of Queen Victoria. The vase was stamped from a piece of so-called wrought steel, probably wrought iron and the convolutions of the design were effected to a high degree of uniformity and without joint or seam of any kind.

At the time of the exposition machine stamps or presses were unknown in Great Britain and the new product was heralded as opening a large era for the tin plate industry of that country. The metal apparently was first drawn into rough cylindrical shape and spun to the final form. It was this drawing of the metal that represented the important advancement in the art, of forming metal. Mr. Griffiths who was the founder of the iron plant of Griffiths & Browett, Birmingham, at which the vase was made, was awarded a gold medal by the exposition in recognition of the great advance in manufacturing processes then in use which his exhibit signalized. An interesting story lies behind the placing of the vase in Mr. Tener's keeping. In 1889 in Nottingham Mr. Tener first saw the vase at the home of his aunt who was the daughter of the inventor of the process by which it was made. Subsequently, the historical value of the specimen was impressed upon him especially in view of the rapid strides which the industry of stamping and drawing steel was making in this country. Finally he prevailed upon his cousin, Charles Griffiths Wallis of Edgebaston, Birmingham, grandson of Thomas Foxhall Griffiths to turn over the piece in order to insure its preservation for future generations. The vase is being placed in the industrial museum of the American Steel & Wire Co., Worcester, Mass., where have been collected innumerable and interesting models, literature, photographs, devices, mementos and other evidences of historical value relating to the iron and steel industry of this country in early years, especially as applied to the wire making branch.

The accompanying illustration gives a reproduction of the vase and also of a tear bottle an article which long since has passed out of practical use which was made by the same drawing and stamping process developed by Mr. Griffiths.

dicted that this line of development will open new and important fields for the output of power presses. When the production rate of 120 per minute already attained on copper radiator tubes is considered the prediction is decidedly interesting.

The use of pressed steel parts in the construction of railroad equipment and rolling stock has been and is now concerning both the pressed metal contractors and the builders of equipment. This particular field is regarded as one of the most promising for cultivation by the redevelopment work of those firms equipped to handle articles of fair up to the largest size. It is notable that pressed steel wheels which were originally utilized in the smaller type of industrial trucks and railways are now made for freight cars.

The recent entrance of one of the most prominent steel companies into the manufacture of pressed steel specialties is significant. The object was, of course, to provide an additional outlet for its raw products. As evidence of the unusual possibilities inherent in the power press, this company is producing pressed steel truck wheels, using I-beam sections instead of the ordinary sheet stock. The spokes are formed economically from half the web, while the flange, after a series of bending and forming operations, becomes the rim, one weld sufficing to complete the wheel ready for bolting to the hub unit, produced separately.

The shipbuilding situation is rsponsible for having turned the thoughts of several shipbuilding concerns toward utilizing their plants in the production of pressed metal. With both the steel companies and the shipbuilders entering the field there doubtless will be still more keen competition during the coming year. This, however, should be of distinct advantage, providing incentive to effective sales promotion.

It is obvious to those in touch with the year's developments that the industry is more thoroughly alive and striving more successfully to extend its activities than it has been in the past. Its activity during the war developed new possibilities that were then applied solely to production for war use. The process of digesting and turning this war-worn development to ordinary commercial applications has been largely completed. One important result of the present intensive sales policy is already in evidence. This is an awakening interest on the part of engineers engaged in varied manufacture in securing more definite engineering data regarding pressed metal manufacture. Concerted effort by the industry, supplementing the activities of its individual interests, will be beneficial in broadcasting its many advantages to the manufacturing world.

Developing Better Refractories

Faced by Need of Improved Fire Brick and Fire Clay, Manufacturers and Users Are Co-operating To Work Out Problems—New Materials Seem To Possess Desired Properties

BY ROBERT T. FERGUSON

GRADUAL and continuous progress has been made in the field of refractories during 1922. The demand in all industries for greater production per unit, which was so augmented during the war, has continued and still imposes on the refractories conditions more and more severe. Higher operating temperatures are employed in many more processes than formerly and insulation often is applied in order that these high temperatures may be more quickly reached. Furthermore, the use of a fuel of lower grade often requires the substitution of a forced draft for a natural draft, resulting in a concomitant added duty for the firebrick. The use of oil fuel and powdered coal with their high local temperatures and high flame velocities requires refractories designed to withstand these conditions.

These tendencies generally have been recognized and frequently discussed and it is the effort to meet them that constitutes progress in the development of refractories. Manufacturers, individually and collectively, have co-operated with large users in an attempt to find new refractory materials and to make better use of those already known. Effort has been directed along five different lines of improvement: Greater uniformity, higher melting point, greater resistance to thermal shock, stability of volume, and resistance to slag action. Some progress has been made in each of these five lines of investigation.

The author is industrial fellow, Refractories Manufacturers Association Fellowship, Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh.

Striving for Greater Uniformity

Lack of uniformity has been one of the complaints in the past, but each year sees a wider use of modern equipment and a continued improvement in plant practice, so that firebrick can now be made with remarkably small variations. To a large extent this is due to the careful testing of the raw materials. Nearly every important refractory manufacturer has adopted a system of regular tests and it is safe to say that despite curtailed production there were more laboratory tests made throughout the country on refractory materials during 1922 than in any previous year. But, in addition to the raw materials, the quality of the product is dependent in a large measure on the fineness of the grind, the proportion of the various sizes, the quantities of the various clays, and the amount of water used in the mix. Plant practice has improved in respect to each of these considerations and this year has seen an extension of modern methods. It was formerly the custom to grind clay in the wet pan, controlling the fineness to some extent by the time of grinding and the amount of water by the feel. Now, dry grinding and screening insure uniform size, automatic feeders proportion the various clays, and the poidometer controls the amount of water entering the batch. With the further application of these methods in the future, uniformity will become less and less of a problem.

Refractories of higher melting point have been secured by the introduction of new materials. That which gives promise of greatest usefulness is the Missouri diaspor. This mineral, which is a

Five Problems and What Is Being Done To Solve Them

CHANGING conditions constantly are placing additional burdens on the development of suitable refractory materials for metallurgical operations. Attempts have been made by individual companies, by government bureaus, and by others to improve the quality of clay and brick, but the results have not been as gratifying as could be desired. Realizing that the problem is serious enough to justify co-operative effort, the Refractories Manufacturers' association, working with committees of various other associations and users of refractories, have undertaken a survey of furnace conditions to which fire clay and brick are subjected.

In the meantime, the work outlined in the accompanying article is going forward. The problems encountered and the methods of dealing with them are set forth below.

The problems involve obtaining in refractory materials the following:	The attempts now being made to solve these problems, as summarized from the accompanying article, are:
1. Greater uniformity.	1. Insisting on regular tests of material; substituting dry grinding and screening of clay for wet grinding; and controlling water content by the use of poidometer.
2. Higher melting point.	2. Introducing new materials, including Missouri diaspor, which fuses at a point from 200 to 300 degrees Fahr. higher than first quality firebrick.
3. Greater resistance to thermal shock.	3. Controlling the grind; growing use of calcined clay; edge-repressing of brick to remove laminations; searching for clays with open-burning tendencies.
4. Stability of volume.	4. Use of brick calcined at high temperatures in electric furnaces; use of California periclase, spinel, sillimanite and fused silica.
5. Resistance to slag action.	5. Developing a test suitable for studying slag action; results still in indefinite form.

hydrate of alumina, is found in northern and central Missouri. The chemical composition lies between the following limits:

	Per cent
Loss on ignition	9.0 to 18.0
Silica	5.0 to 20.0
Alumina	50.0 to 75.0
Iron oxide	0.5 to 4.0
Titania	2.0 to 3.5
Lime	0.2 to 0.5
Magnesia	0.1 to 0.8
Alkalies	0.3 to 1.3

It occurs in egg-shaped formations, diaspor being the yolk, flint clay the white, and limestone the shell. This lenticular occurrence requires careful exploration and frequent tests. The field has been carefully exploited during the past year. The deposits were thoroughly cored and many samples were analyzed and tested. Bricks made from this diaspor are now on the market and are finding a widening use. Frequently they may be used to advantage where first-quality fire clay brick will not stand up. The mineral has a high melting point and brick are made which fuse at cone 40, a temperature from 200 to 300 degrees Fahr. higher than that at which first-quality firebrick fuse.

Uses of Diaspor Brick

Diaspor brick have a denser texture than the usual flint clay brick and a decidedly greater resistance to slag action. They are of value where high local temperatures must be met. The new product is being used more and more as a cement liner and to some extent in the lead industry. It is well suited for electric furnaces melting brass, white metal, nickel and monel. The fact that diaspor withstands the action of iron scale better than fire-clay should make these brick useful for soaking pits, heating and heat treating furnaces and for the hearths of forging and welding furnaces, and other places where scale is apt to accumulate.

Resistance to sudden changes in temperature is one of the qualities that is much to be desired in a refractory, especially where operation is intermittent. Distinct forward steps have been made in the last few years in reducing loss by spalling, principally because of a better understanding of the underlying causes. The advantage of coarse grind over fine grind has been demonstrated both in the laboratory and in the plant. The relative value was raised in one case from 12 to 25 by simply controlling the grind. The value of calcined clay as a means to prevent spalling has been widely recognized. By this means the resistance is increased about 5 per cent for every per cent of grog that is added. Laminations due to the die have been found to weaken the brick and make it an easy prey to thermal shock. These laminations are removed by edge repressing and the bricks are greatly strengthened thereby. This is done by repressing the green brick in such a way that what was once the edge becomes the face. But of most importance is the discovery of the close relation between vitrification and spalling. It was first pointed out by R. M. Howe in 1921 that clays which vitrify early also spall badly. Since then, the method of testing has been modified so as to take into account the firing behavior of the brick; manufacturers have searched for clays with open burning tendencies; and furnace builders have re-examined their specifications. The net result has been that the average quality of clay refractories has been raised insofar as spalling is concerned.

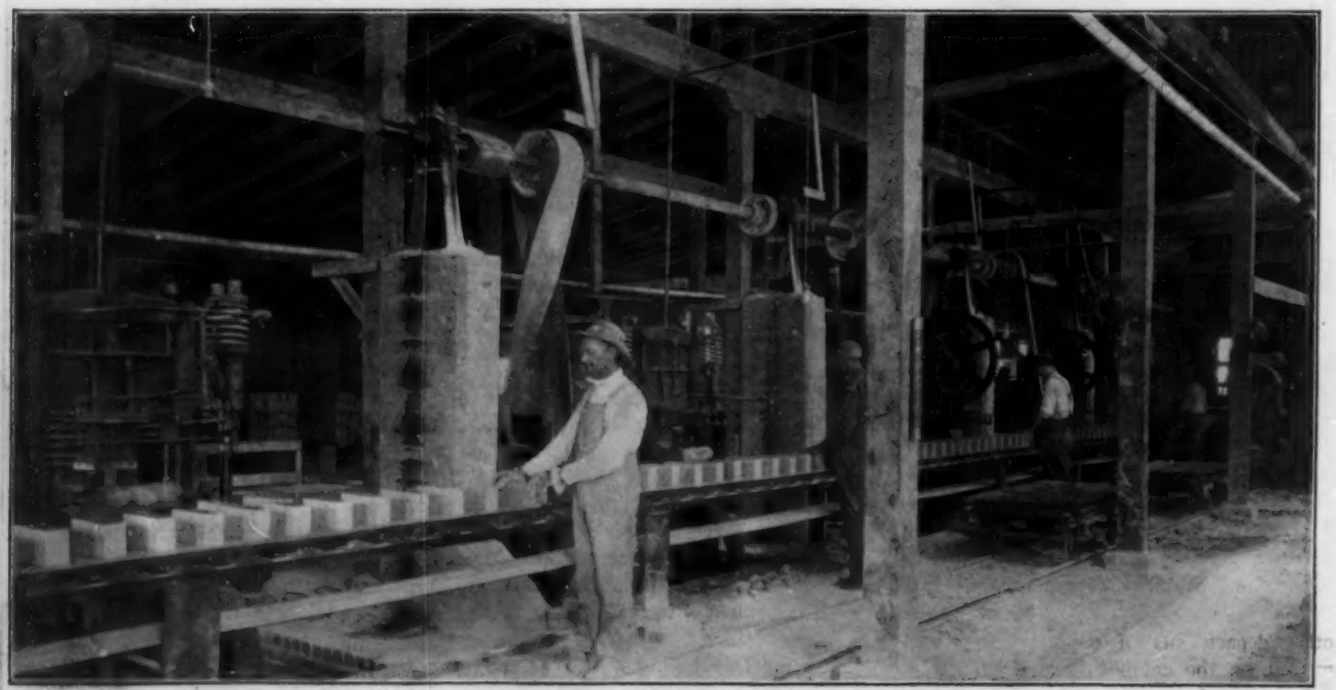
The practical furnace man will ask, "Has all this work in any way benefited us who use firebrick in our everyday work?" In answer it may be cited that one company, whose brick 18 months ago failed in the spalling test on the fourth dip, now is regularly making brick which pass the twentieth dip.

Shrinkage Is Factor

High melting point alone is of little value if the refractory is inclined to shrink. A roof will fail if the brick that compose it shrink too much even if they have not approached their softening temperature. Excess shrinkage causes cracks to open between the bricks, with the result that they are then heated from the sides as well as from the end. This promotes vitrification which increases spalling.

A material which should prove of value in ferrous metallurgy is the periclase from California. Periclase is crystalline magnesium oxide. With a specific gravity of 3.674 and a melting point of 2800 degrees Cent. (5070 degrees Fahr.), it is the densest form of magnesia. It is formed by heating amorphous magnesia to a high temperature. In California where cheap power is available, this is accomplished in an electric furnace. Periclase differs from amorphous magnesia in many of its properties. It is almost inactive chemically toward carbon dioxide and moisture.

There are other electric furnace products which are now made commercially



MODERN REFRACTORIES PLANTS ARE EQUIPPED WITH EFFICIENT HANDLING MACHINERY

Prices Present and Past

Representative market figures yesterday, and for last month, three months ago and one year ago

	Jan. 3, 1923	Dec. 1922	Oct. 1922	Jan. 1922
PIG IRON				
Bessemer, valley, del., Pitts.....	$29.27	$30.27	$35.12	$21.51
Basic valley	26.00	25.00	30.60	18.35
*No. 2 foundry, del. Pittsburgh.	28.77	27.37	33.62	21.81
*No. 2 foundry, Chicago	28.00	28.00	31.75	19.00
Lake Superior charcoal, Chicago	33.15	35.40	36.15	31.50
Malleable, valley	28.00	26.25	32.90	19.55
Malleable, Chicago	28.00	28.00	31.75	19.00
*Southern No. 2, Birmingham..	23.00	22.65	27.40	16.00
*Southern Ohio, No. 2, Ironton..	27.50	27.15	32.40	19.60
Basic eastern del., eastern Pa..	27.00	27.40	30.25	20.25
**No. 2X, Virginia furnace	27.50	27.75	33.00	21.75
**No. 2X, eastern del. Phila....	28.76	28.45	33.00	21.55
Gray forge val. del., Pittsburgh..	27.77	27.12	33.27	21.06
Ferromanganese, del., Pittsburgh	104.91	104.91	105.47	61.90
SEMIFINISHED MATERIAL—				
Sheet bars, bessemer, Pittsburgh.	36.50	36.75	39.85	30.00
Sheet bars, open-hearth, Pittsburgh	36.50	36.75	39.85	30.00
Billets, bessemer, Pittsburgh.....	36.50	36.75	40.00	29.00
Billets, open-hearth, Pittsburgh...	36.50	36.75	40.00	29.00
FINISHED MATERIAL				
Steel bars, Pittsburgh	2.00	2.00	2.00	1.50
Steel bars, Chicago	2.00	2.00	2.00	1.60
Steel bars, Philadelphia	2.275	2.30	2.325	1.86

	Jan. 3, 1923	Dec. 1922	Oct. 1922	Jan. 1922
FINISHED MATERIAL Continued				
Iron bars, Philadelphia	$2.275	$2.25	$2.325	$1.86
Iron bars, Chicago mills	2.35	2.35	2.50	1.60
Beams, Pittsburgh	2.00	1.95	2.00	1.50
Beams, Philadelphia	2.225	2.25	2.325	1.81
Beams, Chicago	2.10	2.10	2.10	1.63
Tank plates, Pittsburgh	1.90	1.90	2.05	1.50
Tank plates, Philadelphia	2.225	2.25	2.425	1.81
Tank plates, Chicago	2.10	2.10	2.10	1.60
Sheets, blk., No. 28, Pittsburgh.	3.35	3.30	3.50	3.00
Sheets, blue anl., No. 10, Pitts.	2.50	2.50	2.60	2.25
Sheets, galv., No. 28, Pittsburgh	4.35	4.35	4.50	4.00
Wire nails, Pittsburgh	2.70	2.70	2.70	2.50
COKE—				
Connellsville furnace, ovens.....	9.00	6.90	10.60	2.75
Connellsville foundry, ovens.....	9.50	7.85	12.10	3.85
OLD MATERIAL—				
Heavy melting steel, Pittsburgh.	20.50	20.00	21.35	14.50
Heavy melting steel, east. Pa..	17.50	16.70	18.00	11.75
Heavy melting steel, Chicago....	17.75	17.00	18.50	11.20
No. 1 wrought, eastern Pa.....	18.75	18.90	22.50	15.50
No. 1 wrought, Chicago.....	18.00	17.25	20.40	11.80
Rails for rolling, Chicago.....	19.00	18.00	20.50	12.50

*1.75 to 2.25 silicon **2.25 to 2.75 silicon

and which eventually may find a useful place in furnace construction. Among these are spinel which is magnesium aluminate; sillimanite, which is aluminum silicate; and fused silica. These are all characterized by high melting points and by the fact that they will not shrink in the furnace.

The problem of slag action on refractories has always been a serious one to the metallurgical industries. Progress in combating slagging has been hampered by the lack of a suitable test. Considerable work has been done in the past year toward developing such a test.

British Trade Heavier; Some Prices Advanced

Staff Cable

London, Jan. 2.—The new year has opened with prices in the British iron and steel market slightly higher. Pig iron interests are anxious over the advance in furnace coke, the most recent increase being from £1 2s 6d ($5.24) a week ago to £1 3s ($5.36) for Yorkshire fuel.

Business in general is heavy but there is little prospect for much of an advance in prices owing to the large proportion of idle plant facilities still available. Some interests here fear that the rise in sterling exchange presages the re-entry of English semifinished and finished steel in the British market.

The French pipe market is active but other departments of the iron and steel market on the continent are quiet. The dissolution of the French steel syndicate is expected to increase international rail competition. The future of other French selling continues, including the plate syndicate, uncertain. The Northern railroad of Spain has ordered 5000 tons of rails from home mills, claiming that American and Belgian bids were high.

Stronger Prices

Shown Throughout Iron and Steel List as New Year Begins

Pittsburgh, Jan. 2.—The year closed quietly in the pig iron market, with only a few transactions noted for small lots. Prices, however, are inclining upward.

The Union Steel Castings Co., Pittsburgh, placed 600 tons of bessemer at $27.50, valley. Basic is quoted here this morning at $27.50, valley. No. 2 foundry is selling in small lots at $28, valley, and $28, Scottdale. On 500 tons of No. 1 $29, Scottdale, was quoted.

A Buffalo blast furnace which sometime ago covered on its coke needs for the first quarter at $7 or less, was unable to obtain below $9, ovens, this morning on an additional 4000 tons for January.

Considerable buying is noted in plates, shapes and bars, particularly in bars. Of the three, plates continue the weakest with 1.90c and 1.95c prices prevailing as against a firm minimum of 2.00c in both shapes and bars.

Prices on billets, sheet bars and slabs remain at $36.50, Pittsburgh. Most tonnage has been obligated. Forging billets continue to sell in lots up to 200 tons at $47.50, quotations of $41.50 to $43.50 being nominal. Wire rods are quoted at $45 to $47.50 with little tonnage available. Interest in the skelp market is centered in the needs of the National Tube Co. This user is reported about to close on at least 10,000 tons. Skelp is quoted at 2.00c to 2.10c, base Pittsburgh.

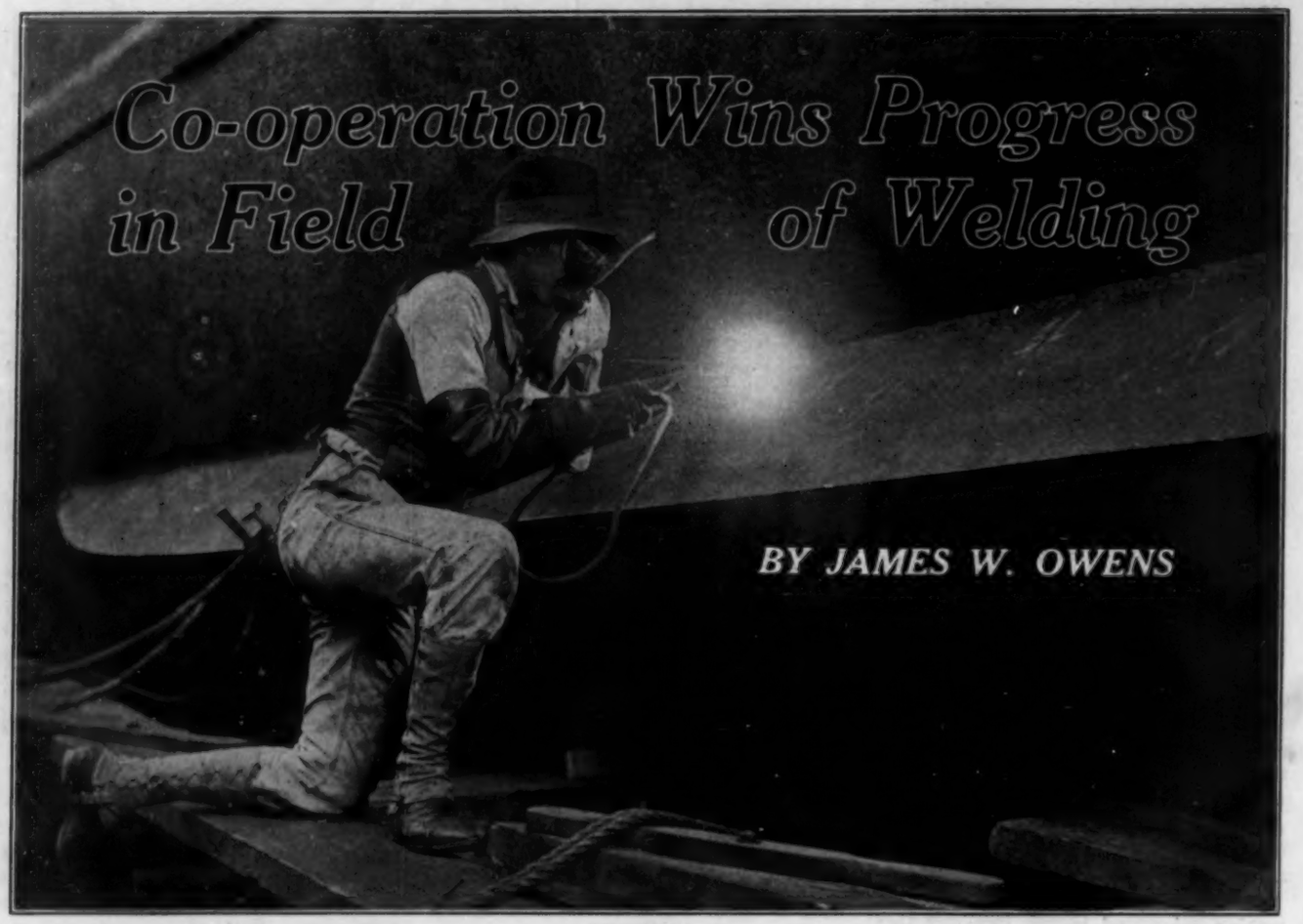
Other independent producers of wire, including the Cambria Steel Co. and the Youngstown Sheet & Tube Co., have followed the Pittsburgh Steel Co. in increasing prices $2 per ton. All are fairly well booked up at the lower levels. The pipe market continues strong.

The levels of the American Sheet & Tin Plate Co. of 2.50c, 3.35c, 4.35c and 4.70c are fairly representative of the market on blue annealed, black, galvanized and full-finished automobile sheets, respectively. The Bethlehem Steel Co. has withdrawn sheet prices and an advance is expected shortly.

1922 Sales Near Record

Chicago, Jan. 2.—An important steel producer in the Chicago district finds from its records of 1922 that its sales for the year were the largest in its history with the exception of 1920. The total for 1920 was only a few points larger than for 1922. One producer in the Chicago district now has practically enough tonnage to absorb its total production for the first six months of 1923 and with business still offering, indications are that it will have a capacity operation through practically the entire year.

Co-operation Wins Progress in Field of Welding



BY JAMES W. OWENS

IN CONSIDERING the developments during 1922 in the field of welding, it is desirable, first of all, to obtain a clear idea of the various existing methods of welding and their subdivisions. These are presented in the accompanying diagram.

It may be said that there has been no outstanding, single development during the past year, progress consisting of numerous improvements in the technic of welding. There has been a wider application of the various forms of welding in the industrial field; a greater willingness on the part of executives and engineers to consider its application to their various problems; a better understanding by engineers of the fundamental principles involved; a willingness on the part of associations, manufacturers of welded products and users of welding to cooperate with the American Welding society in research; an increased recognition of that society as an authoritative source of information; and finally the growth and extension of the activities of the society.

While these various phases of progress are mentioned separately, they are inevitably linked together, for they all reflect increased knowledge of the science and art of welding. The events of the year indicate that welding is being placed on a sound engineering basis.

Progress in seam resistance welding has been in the increase in thickness of the sheets welded, the maximum now being ⅛-inch at an average speed of 20 feet per minute. In spot resistance welding, improvement of the weld has been effected by applying higher mechanical pressures and making the welding machine wholly automatic as to time and pressure. In butt resistance welding progress is reflected by an increase in the amount of "heavy" welding (welds of 16 to 20 square inches cross section) and by the further development of the practically instantaneous contact flash weld, with which stock of 1-inch and 1½ inch diameter can be welded.

Improvements in Gas Welding

In gas welding, progress has been principally in a closer attention to securing a more uniform and consistent technic. The more extensive application of preheating to cast iron, principally to welding and annealing, can be cited as an instance of improvement in technic. Brazing with tobin bronze has proved practicable for the repair of broken pieces of malleable iron, and it has been determined that if a white iron welding rod is used for welding white iron, the welded section can be successfully malleableized. The use of brazing for repairing heavy cast iron sections and copper has been greatly extended. Rail welding has made much progress as a result of a determination of the correct metallurgy for the welding of high carbon steel. The use of the oxyacetylene and oxyhydrogen flames in cutting and heating operations has been used more extensively, thus greatly reducing the cost of production and repair. The welding of pipe lines has advanced rapidly; in one instance 140 miles of 8-inch pipe was laid in which all the joints were welded.

Progress in electric arc welding has been marked by the improvement and greater use of automatic carbon arc welding machines, the more extensive use of automatic and semi-automatic metal arc welding machines and the use of larger electrodes for manual metal arc welding. On the railroads and in the mills, ¼, ⅜ and ½-inch diameter electrodes are being used

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The author is assistant shop superintendent in charge of welding, United States navy yard, Norfolk, Va.

successfully in the repair of broken engine frames and worn rolling mill wobblers.

At the Norfolk navy yard, ¼-inch diameter electrodes recently were used almost exclusively on a production job, the metal welded being ⅜, ½ and 1-inch ship plate. About 98 per cent of the welding was on ⅜-inch plate and 88 per cent in the flat position. All welds were full fillets. The total amount of metal deposited was 1271 pounds and the linear feet welded totaled 3332. The average rate of deposit was 2.40 pounds per man-hour with an average linear speed of 8.24 feet per man-hour. The maximum production per man-hour was 3.22 pounds of metal and 11.33 feet, this being obtained on ⅜-inch plate and a full fillet weld in the flat position.

Has High Tensile Strength

A manufacturer of welding materials recently has produced thermit steels having a tensile strength as high as 104,000 pounds per square inch. So far these are lacking in ductility, but many of those around 80,000 pounds per square inch have good ductility and resist shock and fatigue satisfactory.

In January of this year the American Welding society started the monthly publication of its *Journal*. The need of such a publication long had been felt by the members of the organization, the welding industry and engineers in general. The society has nine sections—in Philadelphia, Chicago, Pittsburgh, New York, Northern New York, Cleveland, San Francisco, Los Angeles and Boston, the last three sections having been organized this year. It now is organizing sections in Atlanta, Denver, Portland, Seattle, Salt Lake City, St. Louis and Cincinnati. It has developed during the past year a program of cooperative research, the idea being to designate a region or section to carry out investigations planned by its branch organization, the American Bureau of Welding. This bureau also is the advisory committee of the division of engineering of the National Research council. It was created to provide an impartial means for the scientific study of the many problems involved in welding and to establish codes and standards.

The first extensive research to be undertaken under this sectional plan was that on the electric arc welding of cast iron, which was assigned to the Northern New York section. This research committee already has submitted its report to the bureau in the form of a symposium, in conjunction with the reports of the gas and thermit welding committees.

The cooperation of other associations and users of welding in the American Welding society's research program is indicated by the recent action of the American Railway association in contributing $10,000, and in the offer of several of the larger electric railway companies to contribute amounts up to $1000 for carrying on the investigations of the bureau's rail joint committee. This committee has prepared a 73-page bulletin on the "Present State of the Art of Making Welded Rail Joints" and now is actually at work making chemical, metallurgical, physical and service tests on the different types of rail joints made by the various forms of welding.

The American Society for Testing Materials has a committee on "Steels for Welding Purposes." This committee is undertaking, through a subcommittee, a revision of "Specifications for Plate for Forge Welding," and is keeping in close touch with the American Welding society through two of its members who were appointed to represent the testing society on the American Bureau of Welding's committee on "Specifications for Steel to be Welded."

Tests Steels for Welding

Already this committee of the bureau has made preliminary tests on steels of various carbon content from almost carbonless ingot iron to steel of 0.60 per cent carbon and has developed a method of testing the suitability of these various materials for welding purposes. It is believed this test will be valuable to the industry.

A pressure vessel committee has been organized by the bureau and is actually at work. The committee is composed of a number of manufacturers of pressure vessels. Each cooperating manufacturer will weld three tanks, according to his standard practice, of a size that will be determined by the committee. Tanks will be tested to destruction. It is hoped that the results obtained will indicate which of certain practices now employed by different manufacturers are the best and make it possible to draw up a code for the welding of pressure vessels.

Welds Large Gas Holder

The storage tank committee of the bureau has prepared specifications for gas and metal arc welded tanks, 40 to 50 feet in diameter and 25 feet high. The Standard Oil Co. has agreed to construct one of these tanks. In this connection it should be noted that a metal arc welded gas holder, 200 feet in diameter with three 30-foot telescopic lifts recently was erected in Melbourne, Australia, by the Metropolitan Gas Co.

A bulletin has been issued by the bureau on "Standards for Arc Welding Apparatus." "Proposed Standards for Resistance Welding Transformers," and a "Resistance Welding Nomenclature" have also been prepared by the bureau during the year.

The year witnessed a growing disposition among manufacturers of all kinds to systematize and coordinate welding operations. In a number of large institutions, the welding previously performed independently in each department, now is under the supervision of a welding superintendent, whose closely-knit organization is responsible for all welding in the plant.

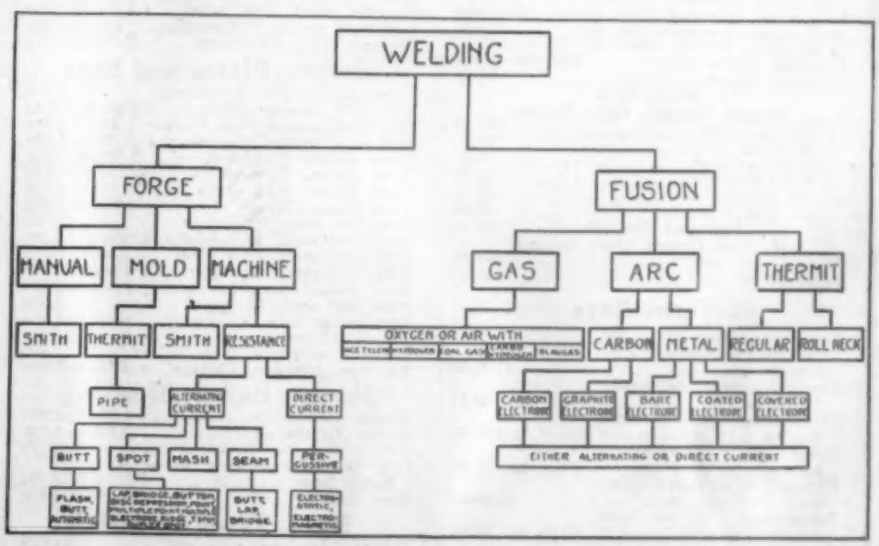


DIAGRAM SHOWING THE MANY DIVISIONS AND SUBDIVISIONS OF FUSION AND FORGE WELDING

Composite Market Average

Representing the Combined Average Prices per Ton of Fourteen Leading Iron and Steel Products, Yesterday, One Week, One Month, Three Months, One Year and Nine Years Ago

January 3, 1923	December 27, 1922	December, 1922	October, 1922	January, 1922	January, 1914
$40.69	$40.65	$40.53	$43.60	$33.35	$23.03

Products Included Are Pig Iron, Billets, Slabs, Sheet Bars, Wire Rods, Steel Bars, Plates, Structural Shapes, Black, Galvanized and Blue Annealed Sheets, Tin Plate, Wire Nails and Black Pipe

Composite Market Record by Months for Nine Years on Page 1802

SCRAP PRICES, PAGE 1800, WAREHOUSE, PAGE 1792, ORE, NUTS, BOLTS AND RIVETS AND PIPE PRICES, PAGE 1796

Iron and Steel Prices

Pig Iron

Bessemer, valley	$27.50
Bessemer, Pittsburgh	29.27
Basic, valley	26.00 to 27.00
Basic, Pittsburgh	27.77 to 28.77
Basic, Buffalo	26.50
Basic del., eastern Pa.	26.50
Malleable, valley	28.00
Malleable, Pittsburgh	29.77
Malleable, Chicago	28.00 to 28.50
Malleable, Buffalo furnace	27.00 to 28.00
Malleable, del., eastern Pa.	27.50 to 28.50

FOUNDRY IRON SILICONS

No. 2 Northern	1.75 to 2.25
No. 2 Southern foundry	1.75 to 2.25
No. 2X East'n and Virginia	2.25 to 2.75
No. 1X Eastern	2.75 to 3.25
No. 1 Chicago	2.25 to 2.75
No. 2 foundry Eastern	1.75 to 2.25

No. 1X, eastern del., Phila.	29.76 to 31.13
No. 1X, Buffalo	28.00 to 29.00
No. 2 foundry, valley	27.00 to 28.00
No. 2 foundry, Pittsburgh	28.77 to 29.77
No. 2 foundry, Buffalo	26.00 to 27.00
No. 2 foundry, Chicago	28.00 to 28.50
No. 2 foundry, Granite City	29.00 to 30.00
No. 2 foundry, Ironton fur.	27.50 to 28.00
No. 2 foundry, Cleveland del.	27.50
No. 2 foundry, del., Phila.	27.76 to 29.13
No. 2 foundry, N. J. tidewater	28.39 to 29.76
No. 2X, eastern del., Phila.	28.76 to 30.13
No. 2X, east. N. J. tidewater	29.39 to 30.76
No. 2X, eastern del., Boston	32.15 to 33.65
No. 2X foundry, Buffalo fur.	27.00 to 28.00
No. 2X, Buffalo del. Boston	31.91 to 32.91
No. 2 southern, Birmingham	23.00 to 25.00
No. 2 southern, Cincinnati	27.05 to 29.05
No. 2 southern, Chicago	29.01 to 30.01
No. 2 southern, Philadelphia	30.80 to 32.80
No. 2 southern, Cleveland	29.01 to 31.01
No. 2 southern, Boston (rail)	32.61 to 33.61
No. 2 southern, St. Louis	28.17 to 30.17
No. 2X, Virginia furnace	27.50 to 29.00
No. 2X, Virginia Phila.	32.67 to 34.17
No. 2X, Virginia Jersey City	33.04 to 34.54
No. 2X, Virginia Boston	33.42 to 34.92
Gray forge, eastern Pa.	27.50 to 28.00
Gray forge, val. del.	27.77
Low phos., standard, valley	35.00 to 36.00
Low phos., standard, Phila.	Nominal
Low phos., Lebanon furnace	30.00
†Low phos. British tidewater	28.00 to 29.75
Charcoal, Birmingham	32.50 to 34.00
Charcoal, Superior, Chicago	33.13

Silvery Iron
Jackson County, Ohio, furnace

8 to 9 per cent	$35.50
9 to 10 per cent	37.50
10 to 11 per cent	39.50
11 to 12 per cent	42.00
12 per cent	44.50
13 per cent	47.00

Bessemer Ferrosilicon
Jackson County, Ohio, furnace

10 to 11 per cent	$44.50
11 to 12 per cent	47.80

Ferroalloys

Ferromanganese, 78 to 82 per cent domestic, f.o.b. furnace	$100.00
Ferromonganese, delivered, Pittsburgh	104.79 to 104.91
†Ferromanganese, 79 per cent, English, c.i.f. Atlantic port	100.00 to 100.68
Spiegel 19 to 21 per cent furnace	32.00 to 35.00
†Spiegel, 20 per cent English, c.i.f. Atlantic port	nominal
Ferrosilicon, 50 per cent contract freight allowed	82.50 to 87.50
Ferrotungsten, standard, per pound contained	82.00 to 89.00
†Duty paid.	
Ferrochrome, 60 to 70 chromium, 4 to 6 carbon, per pound contained, makers plant	13.00c to 14.00c
Imported ferrochrome, 4 to 6 per cent carbon	12.00c to 12.50c
Ferrovanadium, 30 to 40 per cent per pound estimated, according to analysis	$3.50 to $4.00
Ferro carbon-titanium, carloads, producers plant, per net ton	$200.00

Coke

Beehive, Ovens

Connellsville furnace	$9.00 to 10.00
Connellsville foundry	9.50 to 10.50
Pocahontas furnace	nominal
Pocahontas foundry	nominal
New River furnace	9.50 to 10.00
New River foundry	11.50 to 12.50
Wise county furnace	7.50 to 8.00
Wise county foundry	8.50 to 9.00
Alabama furnace	7.50 to 8.00
Alabama foundry	8.00 to 8.50

By-Product

Foundry, Newark, N. J., del.	$12.84 to 12.91
Foundry, Chicago, ovens	15.00
Foundry, Boston, delivered	16.00
Foundry, Granite City, Ill., ovens	14.00
Foundry, Alabama	8.00 to 8.50

Semifinished Material

BILLETS AND BLOOMS
(4 x 4-inch)

Open-hearth, Pittsburgh	$36.50
Open-hearth, Youngstown	36.50 to 38.50
Open-hearth, Philadelphia	43.17 to 45.17
Bessemer, Pittsburgh	36.50
Bessemer, Youngstown	36.50 to 38.50
Forging, Pittsburgh	41.50 to 47.50
Forging, Philadelphia	47.67

SHEET BARS

Open-hearth, Pittsburgh	$36.50
Open-hearth, Youngstown	36.50 to 38.50
Bessemer, Pittsburgh	36.50
Bessemer, Youngstown	36.50 to 38.50

SLABS

Pittsburgh	$36.50
Youngstown	36.50 to 38.50

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$45.00 to 47.50
Grooved skelp, Pittsburgh	2.00c to 2.10c
Universal skelp, Pittsburgh	2.00c to 2.10c
Sheared skelp, Pittsburgh	2.00c to 2.10c

Shapes, Plates and Bars

Structural shapes, Pittsburgh	2.00c
Structural shapes, Phila.	2.225c to 2.325c
Structural shapes, New York	2.24c to 2.34c
Structural shapes, Chicago	2.10c to 2.20c
Tank plates, Pittsburgh	1.90c to 2.00c
Tank plates, Philadelphia	2.225c to 2.325c
Tank plates, New York	2.24c to 2.34c
Tank plates, Chicago	2.10c to 2.30c
Bars, soft steel, Pittsburgh	2.00c
Bars, soft steel, Philadelphia	2.225c to 2.325c
Bars, soft steel, New York	2.24c to 2.34c
Bars, soft steel, Chicago	2.00c to 2.10c
Bars, refined iron, Pittsburgh	2.60c to 2.75c
Bars, rail steel, Chicago	2.00c
Reinforcing bars, Pittsburgh	1.90c to 2.00c
Bar iron, common, Phila.	2.325c
Bar iron, common, New York	2.34c
Bar iron, common, Chicago	2.35c to 2.50c

Hoops, Bands, Shafting

Hoops, Pittsburgh	2.75c to 2.90c
Bands, Pittsburgh	2.75c to 2.90c
Cotton ties, per bundle Pitts.	$1.16
Cold finished steel bars, Pittsburgh base	2.50c
Steel shafting	2.50c

Rails, Track Material

Standard bessemer rails, mill	$43.00
Standard open hearth rails, mill	43.00
Relaying rails, St. Louis	27.00 to 31.50
Relaying rails, Pittsburgh	28.00 to 32.00
Light rails, 25 to 45, mill	2.15c
Angle bars, Chicago base	2.75c
Spikes, railroad, Pittsburgh	2.75c
Spikes, small and boat, Pitts.	3.50c
Spikes, railroad, Chicago	2.85c to 3.00c
Track bolts, Pittsburgh	3.85c to 4.00c
Track bolts, Chicago	3.85c to 4.00c
Tie plates, Pittsburgh	2.35c
Tie plates, Chicago	2.35c

Wire Products

100 lbs. to Jobbers in Carloads

Wire nails, Pittsburgh	2.70c to 2.80c
Plain and annealed wire, Pitts.	2.45c to 2.55c
Galvanized wire, Pittsburgh	2.95c to 3.05c
Barbed wire, painted, Pitts.	2.85c to 2.95c
Barbed wire, galv., Pittsburgh	3.35c to 3.45c
Polished staples, Pittsburgh	2.85c to 2.95c
Galvanized staples, Pittsburgh	3.35c to 3.45c
Coated nails, count keg, Pitts.	2.20c to 2.30c
Woven wire fencing (retailers)	68 off
Woven wire fencing (jobbers)	70½ off

Chain, Piling, Strip Steel

Chain, 1-in. proof coil, Pitts.	6.00c
Sheet piling base, Pittsburgh	2.00c to 2.05c
Hot rolled strip steel, Pittsburgh stamping quality	2.75c to 2.90c
Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100-inch and heavier, base	4.50c

Sheets

SHEET MILL BLACK

No. 28, open-hearth, Pittsburgh	3.35c to 3.50c
No. 28, bessemer, Pittsburgh	3.35c to 3.50c
No. 28, open-hearth, Phila.	3.575c to 3.675c
No. 28, open-hearth, Chicago	3.59c to 3.69c

TIN MILL BLACK

No. 28, open-hearth, Pittsburgh	3.35c to 3.50c
No. 28, open-hearth, Chicago	3.69c

GALVANIZED

No. 28, open-hearth, Pittsburgh	4.35c to 4.50c
No. 28, bessemer, Pittsburgh	4.35c to 4.50c
No. 28, open-hearth, Phila.	4.675c
No. 28, open-hearth, Chicago	4.64c to 4.69c

BLUE ANNEALED

No. 10, open-hearth, Pittsburgh	2.50c to 2.75c
No. 10, bessemer, Pittsburgh	2.50 to 2.75c
No. 10, open-hearth, Phila.	2.825c to 2.925c
No. 10, open-hearth, Chicago	2.84c to 2.89c

AUTOMOBILE SHEETS

No. 22 Pittsburgh	4.70c to 5.00c

Tin Plate

	Per 100 lb. box.
Tin plate, coke base, Pitts.	$4.75

Iron and Steel Pipe

Base Discounts Pittsburgh to Jobbers in Carloads

	Black	Galv.
1 to 3-inch, butt steel	66	54½
1 to 1¼-inch, butt iron	34	19

Boiler Tubes

Carload Discount 4 Points Larger

Steel, 3¼ to 13 inches, l. c.	48 to 40 off
Charcoal iron, 3¼ to 4½ inches l. c. l.	11 off
Seamless rot rolled, 3¼ to 4-in., l. c.	1.45 off

Cast Iron Water Pipe

Class B Pipe

Four-inch, Chicago	$55.20 to 56.20
Six-inch and over, Chicago	51.20 to 52.20
Four-inch, New York	61.30
Six-inch and over, New York	56.30
Four-inch, Birmingham	47.50 to 48.00
Six-inch and over, Birmingham	43.00 to 43.50
Three-inch, Birmingham	56.50 to 57.00

Class A pipe is $4 higher than Class B.
Standard fittings, Birmingham, base, $110.00
6 to 24-inch, base; over 24-inch, plus $20; 4-inch, plus $20; 3-inch, plus $20; gas pipe fittings, $5 higher.

December Pig Iron Output Gains

Total for Last Month of Year Goes Above Three Million Ton Level for First Time since October, 1920—Operating Blast Furnaces Are Increased from 240 on Nov. 30 to 250 on Dec. 31

PRODUCTION of coke and anthracite pig iron continued to show improvement during December, closing 1922 with an output of over 3,000,000 tons, the highest rate since October, 1920. The increase over November was approximately 240,000 tons or on an average daily basis about 4700 tons per day. December was the fourth consecutive month to carry on improved production. Operations of furnaces also continued to improve although on a considerably reduced scale compared with increases during the preceding months. During December 10 additional stacks were added to the active list.

MONTHLY PRODUCTION

	1922	1921	1920
January	1,645,804	2,414,753	3,012,373
February	1,630,180	1,929,394	2,984,257
March	2,035,908	1,594,866	3,375,768
April	2,070,161	1,190,751	2,752,670
May	2,309,348	1,215,272	2,991,825
June	2,362,455	1,064,007	3,046,623
Total 1st half	12,053,856	9,409,043	18,163,516
July	2,403,030	864,642	3,043,918
August	1,810,665	954,901	3,145,536
September	2,024,008	985,795	3,124,308
October	2,629,655	1,234,450	3,288,341
November	2,846,110	1,414,958	2,935,081
December	3,086,968	1,642,775	2,700,268
Total 2nd half	14,800,436	7,097,521	18,237,452
Grand total	26,854,292	16,506,564	36,400,968

Despite the time limit handicap in securing production figures for this issue of IRON TRADE REVIEW, a relatively complete report has been obtained. Total production of pig iron during December was 3,086,968 gross tons, an increase of 240,858 tons compared with the 2,846,110 tons of November. On a daily basis the output of December represented 99,579 tons per day and a gain of 4709 tons over the 94,870-ton rate of the preceding month. This was the highest average daily output since October, 1920, when production was at the rate of 106,075 tons per day.

Production of pig iron during 1922 totaled 26,854,292 gross tons as compared with 16,506,564 tons in 1921 and 36,400,968 tons in 1920.

Merchant iron produced in December totaled 662,743 tons and, compared with the 603,348 tons of November, was a gain of 59,395 tons. Reduced to an average daily basis this output represented 21,379 tons per day and an improvement of 1268 tons over the 20,111 tons per day of November. Nonmerchant or steelworks output during December was 2,424,225 tons which, compared with the 2,242,762 tons of the preceding month, was a gain of 181,463 tons. On an average daily basis this output represented 78,200 tons per day and a gain of 3441 tons over the 74,759 tons per day of November.

AVERAGE DAILY PRODUCTION

	1922	1921	1920	1919	1918
Jan.	53,090	77,895	97,172	106,654	77,523
Feb.	58,220	68,906	102,904	105,270	82,794
Mar.	65,674	51,447	108,895	99,614	103,548
April	69,005	39,691	91,754	82,479	109,112
May	74,495	39,202	96,510	67,991	111,351
June	78,748	35,466	101,533	70,467	110,538
July	77,517	27,892	98,190	78,200	109,954
Aug.	58,408	30,802	101,468	88,453	108,983
Sept.	67,466	32,857	104,143	82,692	113,774
Oct.	84,827	39,821	106,075	60,142	112,335
Nov.	94,870	47,165	87,836	80,244	111,595
Dec.	99,579	52,992	87,105	84,711	110,602
Ave.	73,622	45,223	99,456	83,910	105,290

Blast furnaces operating on Dec. 31 totaled 250 as compared with the 240 on Nov. 30 and 218 on Oct. 31. This was the largest number of stacks active since November, 1920, when 255 were operating on the last day of the month. Two merchant stacks were blown in during the month and none blown out. Of the nonmerchant class nine stacks were blown in and one blown out, the net increase being eight stacks. Therefore, the net total gain of both was 10 stacks.

Stacks blown in during the month were: In Ohio: Hubbard No. 2, Youngstown Sheet & Tube Co.; one furnace, Carnegie Steel Co. In Pennsylvania: Emporium, Emporium Iron Co.; two Schoenberger, American Steel & Wire Co.; one furnace, Carnegie Steel Co. In New York: Harriet Y, Wickwire-Spencer Steel Corp. In West Virginia: Riverside No. 2, National Tube Co. In Alabama: Bessemer No. 2, Tennessee Coal, Iron & Railroad Co. In Indiana: Gary No. 9, Illinois Steel Co. In Illinois: Joliet No. 2, Illinois Steel Co.

Stacks blown out during December were: In Ohio, Tod, Brier Hill Steel Co.

DIVISIONS OF PRODUCTION

1921	Merchant	Non-merchant	Spiegel	Ferromanganese	Other ferro
Jan.	474,135	1,940,618	2,542	20,960	4,950
Feb.	338,383	1,591,011	11,566	17,447	4,067
Mar.	276,559	1,318,307	19,746	17,682	3,222
Apl.	238,539	952,212	14,744	13,266	3,163
May	215,703	999,569	2,379	6,853	4,553
June	178,854	885,153	....	4,536	6,090
July	141,326	723,316	4,015	1,509	3,178
Aug.	134,491	820,410	....	3,878	....
Sept.	157,728	828,067	....	3,289	33
Oct.	218,990	1,015,460	....	3,902	990
Nov.	304,535	1,110,423	....	3,525	1,065
Dec.	372,000	1,270,775	....	3,847	1,064
Tot'l	3,051,243	13,455,321	55,042	100,694	32,377
1922					
Jan.	388,322	1,257,482	1,230	5,644	825
Feb.	355,455	1,274,725	4,930	3,618	872
Mar.	390,643	1,645,265	2,095	11,604	1,102
Apl.	375,814	1,694,347	4,211	14,998	828
May	410,404	1,898,944	4,902	15,432	405
June	423,672	1,938,783	4,817	18,254	854
July	441,752	1,961,278	7,176	18,873	1,887
Aug.	343,522	1,467,143	7,925	11,402	976
Sept.	353,604	1,670,404	4,235	10,681	934
Oct.	502,231	2,127,424	12,285	9,193	1,080
Nov.	603,348	2,242,762	4,192	13,232	961
Dec.	662,743	2,424,225	10,591	13,157	990
Tot'l	5,251,510	21,602,782	68,589	146,088	11,714

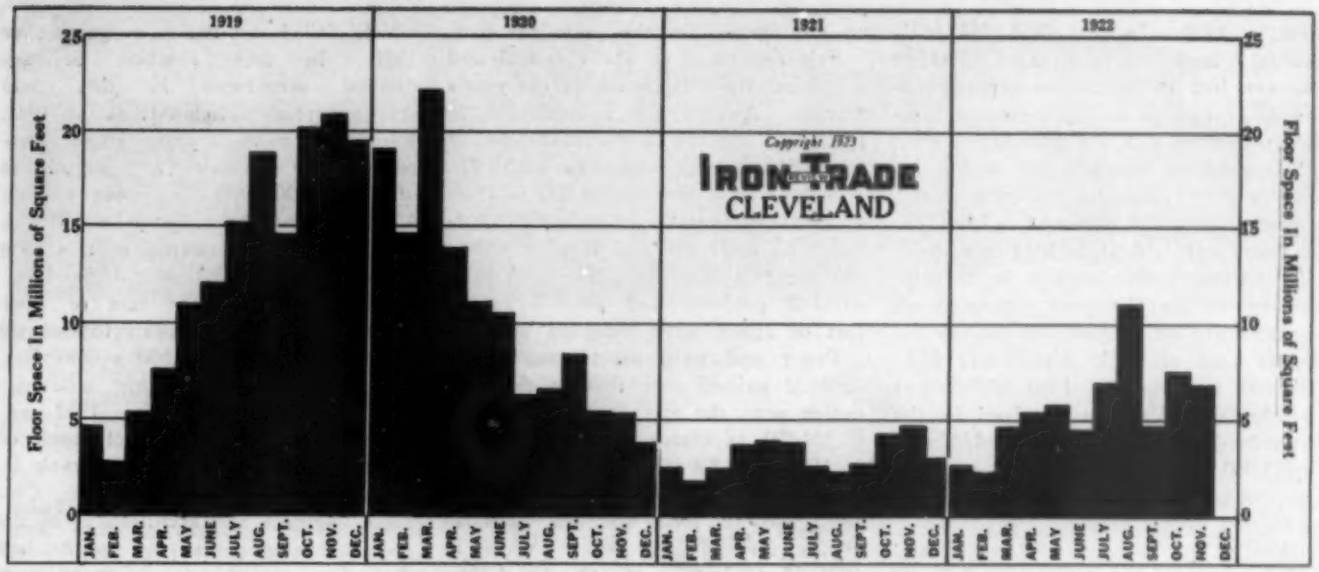
To Dismantle Furnace

Officials of the Republic Iron & Steel Co. have decided to dismantle and scrap the old Hall stack at Sharpsville, Pa. This furnace, which was built in 1846, was one of the smallest and oldest in that district, having an annual capacity of 60,000 tons of pig iron and being of the hand-filled type. The plant had been idle for many years.

DECEMBER PIG IRON

	No. of stacks	Number in blast last day of month December	November	Total tonnage made—Merchant	Nonmerchant	Totals—December	November
Pennsylvania	159	91	87	107,992	999,605	1,107,597	1,035,883
Ohio	80	57	56	168,966	618,262	787,228	729,300
Alabama	43	24	23	133,196	90,104	223,300	208,934
Virginia	19	4	4	21,090	.....	21,090	12,885
New York	26	15	14	67,349	104,634	171,983	161,987
New Jersey	4	1	1	14,953	.....	14,953	12,071
Illinois	26	15	17	59,120	223,093	282,213	258,272
Colorado	5	1	1				
Indiana	16	14	13	33,839	275,663	309,502	279,928
Maryland	6	5	5				
Wisconsin	6	3	3				
Kentucky	7	1	1				
West Virginia	5	3	2	17,114	46,000	63,114	48,685
Tennessee	14	6	6				
Washington	1	..	..				
Georgia	2	..	..				
Texas	1	..	..				
Minnesota	5	3	3	31,720	49,530	81,250	79,780
Michigan	4	4	4				
Missouri	1	..	..				
Spiegel and ferro—all states	..	..	..	7,404	17,334	24,738	18,385
Totals	428	250	240	662,743	2,424,225	3,086,968	2,846,110

MODERN FACTORY BUILDINGS PLAY AN IMPORTANT PART IN THE INDUSTRIAL PROGRESS OF THE NATION. PLENTY OF AIR AND LIGHT ARE PROVIDED FOR IN THESE STRUCTURES, AND PLANT LAYOUTS ARE IDEAL FOR HIGH PRODUCTION. THESE ILLUSTRATIONS WERE FURNISHED THROUGH THE COURTESY OF THE AUSTIN CO., McCLINTIC-MARSHALL CO., THE TRUSCON STEEL CO., AND CLEMENT A. HARDY CO.



Trend of Industrial Construction for Four Years. Chart Compiled from Figures Furnished by the F. W. Dodge Co.

Factory Construction Recovers

Larger Building Programs of 1922 Reflect Improvement in Business Conditions—Rubber Industry Only One Failing To Show Gain in Year—Contemplated Work for Coming Year Is Encouraging

BY WILLIAM M. ROONEY

GAGED by the number and value of new factories and additions to old ones erected during the year, industrial expansion in 1922 exceeded that of 1921 by a wide margin. In fact, while but few factory building programs of consequence were completed in 1921, a fair number of important projects materialized in 1922. This was notably true in several specific industries, while in others the effects of the business depression had not fully disappeared and consequently new plant construction in these fields was limited.

The extent of the increase in industrial construction activities in 1922 can be very clearly grasped when the statistics for the year are placed in comparison with those for the two preceding years. These figures, compiled by the F. W. Dodge Co., New York, and representing actual awards from Jan. 1 to Dec. 1, show that during that period in 1922, contracts were placed on approximately 3563 projects, involving 61,367,700 square feet of floor space, and an estimated construction expenditure of $305,802,600. They compare with 2998 projects, involving 32,975,200 square feet of floor space with an estimated expenditure of $158,772,600 in 1921; and 5853 projects involving 1,662,000,000 square feet, representing an investment of $595,000,000 in 1920.

A comparison of the first 10 months of 1922 with the same period in 1921 made by the Dodge company is interesting. This comparison shows that in 1922 construction projects increased 18 per cent; new floor space made a gain of fully 19 per cent; construction investment increased 96 per cent and the average operation increased from 10,861 square feet to 17,540 square feet.

Recovery of the metalworking industry during 1922 was remarkable. This is quite clearly shown by the factory construction awards in this field during the year. These awards represent an investment of $93,033,900, which compared with $28,436,800 in 1921 and $160,000,000 in 1920, shows the extent of the recovery. The metalworking industry led all others in the amount of money expended in new plant construction. In this field during the year, there were 573 separate projects undertaken involving 19,799,500 square feet of floor space, which compares with 484 projects involving 6,119,300 square feet in 1921.

Awards for miscellaneous industrial structures in 1922 represent an expenditure of $45,485,200, which compares with $34,909,900 in 1921 and $145,000,000 in 1920. Recovery in this field was not marked. Approximately 917 individual projects involving 11,655,500 square feet were undertaken in the year just past, which compares with 755 projects involving 7,841,800 square feet in 1921.

Power and central heating plant construction during 1922 was the greatest since the records were compiled. The statistics for the year show expenditures of $43,921,200 which compares with $16,000,000 in 1921 and $35,000,000 in 1920. During the year 168 individual projects involving 3,509,100 square feet of floor space were awarded, which compares with 105 projects involving 813,000 square feet in the preceding year.

Expansion in the woodworking industry was fair. Awards in this field in 1922 represent an investment of $10,045,000, which compares with $6,266,600 in 1921 and $18,000,000 in 1920. Approximately 165 individual awards involving 8,936,500 square feet were placed during the year, which compares with 185 projects involving 1,823,300 square feet in 1921.

Considerable recovery also was made in the food industry. During the year approximately $38,218,300 was invested in new construction which compares with $26,323,000 in 1921 and $50,000,-

000 in 1920. In this field 767 individual awards involving 8,990,100 square feet of space were placed in 1922, as against 667 projects and 6,447,500 square feet the preceding year.

Considering the fact the mining industry was hindered by strikes and other troubles, industrial plant expansion in this field in 1922 is surprising. Construction awards in this industry during the year represent an expenditure of $19,081,100 which exceeds that of 1921, which was $13,318,000 and that of 1920 which was $18,000,000. Projects involved in the awards during the year total 172 with 2,921,000 square feet of floor space, as compared with 150 projects and 2,307,200 square feet in 1921.

While the textile industry is said to be over-expanded in the matter of factory buildings, awards during 1922 for new construction in this field would indicate those engaged in the industry do not think so. Awards during the year represent an investment of $17,713,000, which compares with $9,763,000 in 1921 and $35,000,000 in 1920. Individual projects in 1922 total 207 involving 4,008,500 square feet, as against 203 projects and 2,554,000 square feet in 1921.

Erection of printing plants was on a larger scale in 1922 than in any year since the records were compiled. The figures for the year show an investment of $10,040,900, which compares with $4,185,000 in 1921 and $8,000,000 in 1920. Approximately 143 individual awards involving 2,002,700 square feet of floor space are shown by the figures for the year just past.

Fair expansion in the chemical and allied industries is shown by the year's figures. Awards for construction in this field involve an expenditure of $8,512,800, which compares with $3,623,300 in 1921 and $20,000,000 in 1920. Projects undertaken in this field during 1922 total 184 and involve 1,986,600 square feet of floor space. A total of 127 projects and 888,300 square feet of space were recorded in 1921.

Paper and pulp plant construction in 1922 gained over that in the preceding year, the total investment being $6,224,400, as compared with $5,414,000 in 1921 and $30,000,000 in 1920. The 84 individual projects undertaken in this field in 1922 involved 1,264,000 square feet of floor space, while in 1921 26 projects accounted for 1,216,700 square feet.

Expenditures for buildings in the leather industry in 1922 exceeded those of the two preceding years. The total investment for buildings during the year was $5,962,000. The corresponding totals for 1921 and 1920 were $2,417,700 and $4,000,000. Awards in 1922 total 78 involving 1,279,500 square feet, which compares with 55 projects and 754,800 square feet of floor space.

The depression in the oil industry is shown clearly by the figures for construction in this field in 1922. Total investment in new buildings during the year was but $4,548,000, which is but slightly in advance of the $3,114,700 expended in 1921 and far below the $18,000,000 investment recorded in 1920. Awards during the year total 48, involving 461,900 square feet, as compared with 47 projects involving 330,500 square feet in 1921.

While construction awards in many industries were small during the year, the rubber industry was the only field which failed to make a gain over 1921. In fact, erection of additional structures in this field was appreciably below that of 1921. Figures for the year show new construction involved an expenditure of $1,142,600 which compares with $2,651,500 in 1921 and $45,000,000 in 1920. Individual awards in this field during the year totaled 33 and involved 388,000 square feet of floor space. In 1921 awards totaled 39 projects involving 767,000 square feet.

Undoubtedly the larger industrial construction program in 1922 was brought about as the direct result of the betterment in business. Frank D. Chase, of Frank D. Chase, Inc., Chicago, engineer and architect, is of the opinion the gain was due to the fact that there was a general cessation of industrial building activity in 1921 and that in 1922, the improved financial conditions warranted some expenditures for new plants. In this, Harold K. Ferguson, of the H. K. Ferguson Co., Cleveland, engineer, agrees.

It is a question whether or not present industrial building capacity is in excess of the country's needs. While there undoubtedly has been considerable over-expansion in some industries, this is not true of industry in general.

Several industrial construction engineers were confident the building capacity of the country was far below its actual requirements and one, Frank D. Chase, went to some length in explaining his view of the situation. He said:

"Industrial plant capacity in this country is not in excess of its needs, contrary to an uninformed general opinion to this effect. The largest industrial building expansion during the war was in the iron and steel industries. The building programs of the large steel and iron corporations

STRUCTURAL STEEL IS EXTENSIVELY USED IN MODERN INDUSTRIAL BUILDINGS. THIS STRUCTURE WAS ERECTED BY THE McCLINTIC-MARSHALL CO.

MODERN FOUNDRY CONSTRUCTION CALLS FOR AN ABUNDANCE OF LIGHT AS DEMONSTRATED BY THE RECENTLY COMPLETED FOUNDRY OF FAIRBANKS, MORSE & CO., DESIGNED BY CLEMENT A. HARDY CO. THE INSET SHOWS A FOUNDRY BUILDING ERECTED SEVERAL GENERATIONS AGO, WHICH AT THAT TIME WAS CONSIDERED THE ACME IN DESIGN

indicate that they do not consider their building capacity in excess of their needs and many large construction programs already are under way in this field throughout the Middle West, and particularly in and around St. Louis.

"The scores of industries which were not expanded during the war because of government prohibition, and which include thousands of plants, are greatly in need of increased capacity. The only possible exception to this, in my opinion, is the textile industry, which is over-built. It is my judgment that there is going to be a large amount of industrial building to take care of, during the next few years, if for no other reason, than that industry must catch up with the normal increase in business. This is quite clearly evidenced to me by the large number of inquiries received from all kinds of manufacturers and by the large number of small plants designed during the past few months."

Harold K. Ferguson states it is his belief that the industrial plant capacity of the country is not in excess of its normal needs. While there are no new demands for factory space at this time in a number of industries, he points out this is due to the fact these industries still are suffering somewhat from the slump they recently have experienced.

From an engineering and production standpoint it is clear factory capacity is below needs. Modern methods of manufacture call for modern buildings. Inadequate structures gradually are giving way to new buildings better designed to meet the exacting requirements of modern manufacturing methods. Many present-day operations require conveying systems which cannot be accommodated in structures built a half century ago, with no thought in mind of housing conveying equipment of any kind. Obviously, the old buildings must go and in their places new structures will arise, designed and constructed to meet the particular manufacturing problem involved.

"Trend in factory construction is to have plants designed which fit the processes of the occupancy," says Mr. Chase. "During the war there was a necessary trend toward standardized buildings. At that time, this form of construction was justified, but today the trend is distinctly toward more economical and efficient buildings. The building which fits the occupancy is as important a part of the equipment of a manufacturer as any machine in his plant."

Commenting on the trend in factory construction, which is but another barometer in gaging future demand, Mr. Ferguson says:

"The use of wood in factory construction is being rapidly eliminated, except in roofs of one-story buildings covering large areas, where wood still is required in considerable quantity. In congested districts the tendency is almost entirely toward fire-proof buildings of steel or reinforced concrete of multi-story design, the latter to increase available floor space. There also is a strong tendency for factories, which have been located in the downtown districts of large cities, to move to the outskirts where large areas of land are available for one-story factory buildings. The one-story factory usually gives a better opportunity for production supervision and plant arrangement than is possible with the multi-story type of construction. One-story buildings usually are designed with as few columns as possible in order to give unobstructed areas of floor space with plenty of light and good air."

These statements are indicative of the general thought regarding the trend of construction and the need for additional buildings. Statistics on contemplated construction, which have been compiled by the Dodge company appear to bear out the statements to a great extent. The figures are for work on which active plans have been started and on which construction work should begin in the new year. They represent contemplated demand for new construction from Jan. 1 to Dec. 1 and are ideal as a barometer in gaging possible future demand.

The statistics, which are for approximately 90 per cent of the country, show there are 4863 individual projects involving $519,372,900 for which construction plans have been or are being prepared. Contemplated construction of power and heating plants is far in excess of that of any other class of structure. The figures show there are 285 projects involving approximately $183,457,400 pending in this field. Power plant construction, from all appearances, will be on an enormous scale next year.

In the metalworking field, contemplated projects total 691, involving $101,584,300, this field being second to that of power. As in the power field, indications point to a healthy expansion in the metalworking industry during 1923. Not only have the larger companies in this industry announced expansion programs, but many smaller companies are having plans prepared for new plants.

Miscellaneous construction, which takes in a variety of plants in industries which really cannot be definitely classified, also will be large. Contemplated projects in this field total 1292, representing about $63,706,900.

Food product plants apparently will participate in a fair expansion program in the coming year. The statistics show contemplated projects in this field total 1077 valued at $62,302,400. While the food producing

industry is well equipped with factory buildings, there appears to be an increasing demand for additional structures."

In the mining field a fair expansion program is planned, when one considers the over-expansion in this industry. Statistics show contemplated projects totaling 242 valued at approximately $21,510,400.

Figures for the chemical industry show contemplated projects totaling 246 representing approximately $16,851,000. In the leather industry projects total 92 valued at $8,806,000; in the oil mill and refinery industry the statistics show a total of 57 contemplated projects valued at $3,892,500. The rubber industry shows figures indicating contemplated projects totaling 43 valued at $1,558,600.

In the textile industry some expansion will be in evidence despite the fact this industry is said to be considerably over-expanded in the matter of factory buildings. The figures for this industry show contemplated projects totaling 248 valued at $19,106,600. Expansion in the glass-making industry will be limited. Contemplated projects here total but 36 valued at $7,955,200. In the paper and pulp field expansion will be fair, contemplated projects totaling 114 valued at $14,255,200. Printing and binding projects will be fairly large, total contemplated projects being 202 valued at $17,053,800, while in the woodworking field there are contemplated projects totaling 228 valued at $11,355,700.

On the whole, construction of factory buildings during 1923 should, if anything, be in excess of that during the year just passed. Mr. Ferguson, in commenting on the outlook for the coming year states:

"We are looking forward to good business in 1923. There should be a considerable amount of new plant construction during the coming year, at least it will be larger than in 1922. The fact that American industry has been considerably underbuilt in the matter of factory buildings during the last few years and the return to normal business in 1923, should warrant a large amount of construction work for new plants and additions to present factories."

Factory building construction during the latter part of 1922 was beyond the expectations of most construction companies, Mr. Chase believes, and demand for new industrial plant buildings in 1923 will be on a par with that of the last few months of 1922, although on more conservative lines than in past years.

Betterment in Business Seen

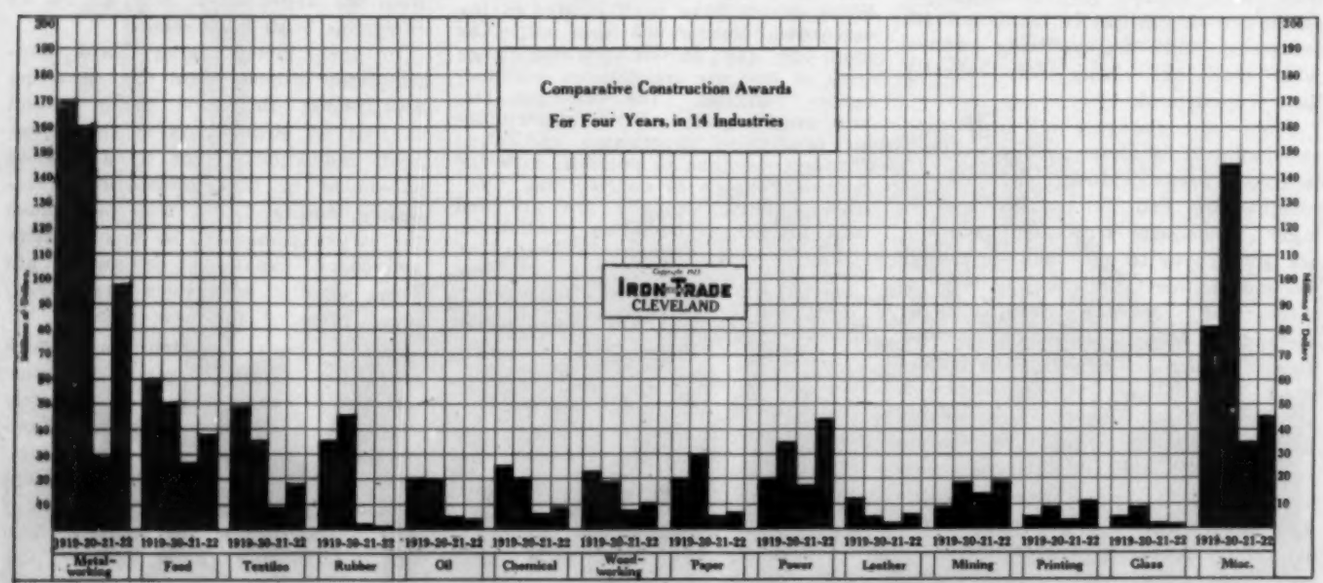
Indicative of the betterment in business in general is the report of the Austin Co., Cleveland. This company during December was engaged on 66 separate building operations, located in 20 different states. Twelve of the projects were in the Middle West, 10 on the Pacific coast, five in New England, 17 in the North Atlantic states, 13 in the Middle Atlantic states and nine in the South. The operations include steel mills, foundries, machine shops, paper mills, furniture factories, laundries, electrical equipment factories, oil refineries, pumping stations, garages, warehouses, textile buildings, varnish factories and others. In fact practically every line of industrial endeavor is represented and as can be seen, practically every part of the country is represented. Other construction companies report similar business.

Obviously the outlook for 1923 is bright in so far as the expansion of plants is involved. Mr. Chase points out that building material prices, which for some time have been a hindrance to new construction programs, reached their maximum in 1918 and 1919 and declined in 1921. However, in 1922 they increased to about 50 per cent over prewar prices. In his opinion prices of building materials in 1923 will hold close to those of 1922.

Mr. Ferguson believes that owing to the uncertainty regarding building material prices, the best time to order factory buildings will be between the first of the year and late spring. He states building material prices reached their low point during the early spring of 1922 and have shown some tendency to advance since then, although in general the advances have been small and marked by frequent recessions, followed by advances.

While building material prices, labor, etc., have a great bearing on the need of new factory buildings, the real demand is brought about through the pressure made on manufacturers for their products. Present indications point to a fair demand for products of all kinds in 1923.

Every new plant project creates a market for equipment of all kinds. A recent investigation of several hundred plant projects, showed that expenditures for equipment would be three times the amount involved in the actual construction work. Judging from the number of industrial plant projects already under way, with those for which plans have been prepared, 1923 should witness an encouraging demand for equipment.



THIS CHART SHOWS THE VOLUME OF CONSTRUCTION IN 14 LEADING INDUSTRIES IN 1922 AS COMPARED WITH THE THREE PRECEDING YEARS, GAINS IN METALWORKING AND POWER PLANT BUILDING BEING OUTSTANDING. THE FIGURES FOR THE CHART WERE FURNISHED BY THE F. W. DODGE CO.

Airplane View Swede Blast Furnace Plant, Swedeland, Pa. *"Airgraph" Photo*

Domestic Market Reviews for 1922

Pig Iron	Ferroalloys
Coke	Structural Shapes
Semifinished Steel	Rails
Tin Plate	Sheets
Cast Iron Pipe	Plates
Merchant Bars	Nonferrous Metals
Welded Pipe	Old Material
Wire Products	Coal By-Products

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Unsettlement Dominates Year

Iron and Steel Industry Beginning 1922 in Depression Struggles Through Effects of Coal and Railroad Strikes and Reaches 1923 with Operations at Best and Prospects Promising—Fair Recovery Is Shown

BY C. J. STARK
Editor Iron Trade Review

IN 1922, the iron and steel industry turned back along the road to prosperity after the drastic readjustments of 1921. Measured by tonnage produced and marketed, considerable progress was achieved and the processes of normal development in the industry which had been violently interrupted by the general economic upheaval, were resumed. Good business, however, with its complement of substantial additions to surplus after liberal allowances for depreciation, renewals and reserves, was not attained. In the financial aspect, the year was decidedly unsatisfactory. With some exceptions, the majority of the iron and steel companies were unable to make much of a showing from the year's operations. This situation may be attributed in large part to factors outside the iron and steel industry and over which the producers had little or no control.

No factor is chargeable more for the troubles of iron and steel manufacturers in 1922 than the coal strike and its attendant effects. These served to increase costs and to disrupt operations at a time when the mills and furnaces were obligated to deliver orders taken at previous lower prices. Starting in June fuel charges were raised abruptly. Following the settlement of the coal strike, wage rates were advanced 10 per cent. These items put up costs sharply and it was figured that with many producers this amounted to at least $5 to $6 per ton. After the fuel market reached its peak in August and prices began to recede, the situation was further complicated by the car priority accorded coal in order to expedite shipments to the Northwest. The iron and steel industry suffered greatly from this and much tonnage was piled up at the mills and furnaces because it could not be moved. This further restricted operations and profits. The railroad strike in the summer, while not a serious cause of curtailment, contributed to the general unsettlement of operations.

Outlook Is Improved

As the year neared its close, car supply had been materially improved by the gradual lifting of the ban on open-top equipment, fuel prices after a fall of $7 to $8 per ton were more nearly stabilized and generally, conditions had approached a state of equilibrium. This enabled production to be brought up to 80 to 85 per cent which was regarded as the maximum to be hoped for during the winter, in view of the limiting factors present. In various products, the mills now are well supplied with orders for 1923 delivery. Steel corporation plants especially are booked for a large fraction of their first quarter production, notably in tubes, tin plate, rails, sheets, wire, steel bars, plates and shapes though independent mills were not so favorably situated in the last three lines. The Steel corporation's unfilled orders from Jan. 1 to Dec. 1 increased from 4,268,414 tons to 6,840,242 tons. Merchant blast furnaces have accumulated a heavy backlog of orders for first quarter delivery, largely as a result of the active buying movement in December which involved at least 1,000,000 tons. Under these circumstances the iron and steel industry is entering the new year in the most favorable position in at least two years and with more cheerful prospects for future operations and profits.

Stocks Are Depleted

This outlook is further strengthened by the depleted condition of the country's stocks of iron and steel. Manufacturing consumers earlier in the year had worked into production tonnages still remaining from swollen inventories of 1920 and 1921 and have not restored these to normal proportions. Stocks of pig iron in the hands of merchant furnaces or steelworks' sellers were shrunk almost 500,000 tons in the year and at present represent a little more than two weeks supply at the current rate of melt of buying consumers.

Pig iron production in 1922 was not as good relatively as that of steel ingots. It amounted to 26,850,000 tons of coke, anthracite and charcoal iron. This total was exceeded by 1912 and 1913 and was practically equaled by 1910. The 1922 output was only 68.3 per cent of the high record for all time of 1916 and was 61 per cent better than the poor preceding year of 1921. The better relative showing of steel ingots against pig iron may be attributed to the larger operations proportionately of open-hearth plants with the factor of heavy scrap consumption involved.

Fair Steel Output

More steel was made in 1922 than in any prewar year. This fact in the face of the generally unsatisfactory returns, financially, from operations serves to emphasize the magnitude of the country's present capacity for making steel. The year's output of ingots, it is indicated, was approximately 33,000,000 gross tons. This represents 75.7 per

cent of the record total of all time in 1917, 76.7 per cent of the second largest year of 1918 but 109 per cent of 1912, the high period prior to the war. The 1922 total shows an increase of 72.2 per cent over 1921. It is practically equal to that of 1919 but was only 80.8 per cent of 1920.

Buying Is Resumed

Demand for iron and steel repressed and denied under the abnormally pinched policies for replacements and betterments practiced during the liquidating period of 1921, reasserted itself with force the past year in various important ways. Conspicuous in this restoration of buying was the return to the market of the railroads, always a basic essential for a broad activity in steel. In better financial circumstances and pressed to handle a large and growing volume of traffic, the transportation systems contracted for new equipment at a rate not equaled in many years. During the first 11 months, domestic lines placed a total of 157,000 freight cars which was more than seven times the number awarded in all 1921 and was the largest in a decade excepting 1916. Motive power orders kept pace with carrying stock and called for a total of 2300 locomotives against about 400 in 1921. Stimulated by an advance announcement of an increase of $3 per ton, the greatest buying movement of rails in a similar period in history appeared prior to Oct. 1. More than 1,500,000 tons of rails was placed within a few weeks' time practically all of which is for 1923 delivery.

Foreign trade in iron and steel in 1922 reflected the disturbed conditions of world business and was much restricted. Exports are estimated at 1,975,000 tons. This total is something like 200,000 less than the depressed year of 1921 and excepting 1914, stands as the smallest since 1920. Imports due to the unusual activity in the buying of British and continental pig iron increased materially and are estimated at 400,000 tons. The total purchases of foreign iron by American consumers in the year are placed at approximately 300,000 tons.

A significant event in the year in connection with the prospects of foreign trade was the disbandment of the Consolidated Steel Corp. organized in 1919 under the Webb-Pomerene act by a number of leading independent companies to carry on a general steel exporting business. The narrowed market and the poor opportunity for American products to compete with foreign material at this time is the explanation given for the action.

Building Is Active

Building construction which had not been on so large a scale in several years called for a heavy tonnage of steel. Structural steel demands were the largest in tonnage since complete records were compiled, dating back to 1913. They aggregated approximately 1,500,000 tons, based on reports for 11 months of 1,460,000 tons. Concrete construction also was unusually extensive and provided a large demand for reinforcing steel. The phenomenal vitality of the automotive industry was the chief factor underlying the active market in sheets, strip steel, bar specialties, alloy steels and other more highly finished products.

Price Trend Upward

Price tendency through most of the year was upward but this was subject to erratic exception particularly during the last quarter. The falling market of the preceding year did not culminate until February. From that low point a gradual rise took place stimulated by an expanding volume of the general demand for iron and steel. The cumulative effects of the coal strike in August and September, bringing sharply increased costs and putting production in check, gave prices the greatest impetus of the year. Then the advance of leading steel products was $5 per ton on the average. Spot coke at this period was up to $14, Connellsville ovens. In October a readjustment of fuel costs and more favorable operating conditions gradually reversed the general trend. Spot coke by this time was selling at $8 per ton. From that point to the end of the year the market went through a gradual settling process as readjustments continued and stabilization was approached. Late in December it appeared that prices were more nearly in equilibrium than they had been in several months.

IRON TRADE REVIEW composite of fourteen iron and steel products accurately measures the year's price movements. The extension of the year's previous decline carried through January and February. From March to September inclusive a steady rise is shown. Then the market undergoing readjustment, turned downward. The composite by months up to December was as follows: January $33.35, February $32.86, March $32.97, April $34.47, May $36.49, June $36.96, July $37.50, August $39.79, September $43.79, October $43.60, November $41.40. The average of the composite for the 11 months was $37.56 compared with $40.74 in 1921, $65.59 in 1920, $56.68 in 1918 and $26.32 for 1913.

Mergers Are Continuing

The year has seen carried forward on a more elaborate scale, the movement toward the merging of various individual steel enterprises, which first became evident in 1921. The most pretentious plan failed of accomplishment in its final stages but others no less important and significant either have been put through or still are being exploited. Prevailing conditions of competition which accent the advantages of thoroughly integrated operations and of large scale production and distribution, serve to explain the present trend toward amalgamation in the industry. High freight rates through their localizing influence on competition also remain a factor notwithstanding the 10 per cent reduction June 15.

Domestic Iron and Steel Prices in 1922

Average Monthly Prices of Leading Materials at Pittsburgh

PIG IRON

	Jan.	Feb.	Mar.	Apr.	June	May	July	Aug.	Sept.	Oct.	Nov.	Dec.
Bessemer	$21.51	$21.31	$21.21	$22.46	$26.46	$26.96	$26.76	$29.16	$35.27	$35.12	$33.77	$31.02
Basic	20.31	19.81	19.86	22.21	26.46	26.96	26.76	27.96	34.27	32.37	29.77	26.52
Foundry No. 2	21.81	20.96	20.96	22.31	25.71	25.96	26.16	32.76	37.02	33.62	30.17	26.77
Malleable	19.55	19.00	19.00	20.25	24.50	24.20	24.25	28.60	34.00	32.90	29.60	27.27
Gray Forge	21.06	20.96	20.96	21.96	25.46	25.96	25.76	30.16	36.02	33.27	29.77	27.02
Bessemer Ferrosilicon, 10 per cent	38.50	37.50	36.50	37.25	40.50	41.50	41.50	42.50	48.50	50.00	48.00	44.50

SEMIFINISHED

Billets, Bessemer	$29.00	$28.00	$28.30	$30.10	$34.50	$35.00	$35.00	$35.00	$39.50	$40.00	$38.80	$36.50
Billets, Open Hearth	29.00	28.00	28.30	30.10	34.50	35.00	35.00	35.00	39.50	40.00	38.80	36.50
Sheet Bars, Bessemer	30.00	29.00	29.40	31.50	35.00	35.00	35.00	35.00	39.50	39.85	38.80	36.50
Sheet Bars, Open Hearth	30.00	29.00	29.40	31.50	35.00	35.00	35.00	35.00	39.50	39.85	38.80	36.50
Wire Rods	37.00	35.75	35.80	38.00	38.00	38.00	39.50	40.00	45.00	45.00	46.50	46.50

COKE

Furnace, Spot	$2.75	$2.95	$3.25	$4.30	$6.00	$6.60	$10.65	$13.20	$11.00	$10.60	$7.10	$ 6.50
Foundry, Spot	3.85	3.80	4.05	4.95	6.50	7.20	11.40	14.30	12.75	12.10	8.40	7.50

ROLLED PRODUCTS

Structural Shapes, base	1.50c	1.40c	1.45c	1.50c	1.60c	1.65c	1.70c	1.80c	2.00c	2.00c	2.00c	1.90c
Plates, base	1.50c	1.40c	1.45c	1.50c	1.60c	1.65c	1.65c	1.80c	2.20c	2.05c	2.00c	1.90c
Steel Bars, base	1.50c	1.40c	1.45c	1.50c	1.60c	1.65c	1.70c	1.80c	2.00c	2.00c	2.00c	2.00c
Cold Finished Steel Bars	2.00c	1.90c	1.85c	1.85c	2.00c	2.00c	2.05c	2.15c	2.50c	2.50c	2.50c	2.50c
Strip, Hot Rolled	2.00c	1.80c	1.80c	1.95c	2.05c	2.35c	2.50c	2.50c	2.75c	2.90c	2.90c	2.80c
Strip, Cold Rolled	3.50c	3.50c	3.50c	3.60c	3.70c	3.95c	4.00c	4.00c	4.25c	4.50c	4.50c	4.50c
Steel Pipe, 1 to 3-in. discount	71	71	71	71	71	71	71	69½	68	67½	66	66
Standard Spikes	2.25c	2.15c	2.05c	2.20c	2.25c	2.30c	2.25c	2.30c	2.80c	2.80c	2.75c	2.75c
Wire Nails, base	2.50c	2.45c	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c	2.70c	2.70c	2.70c	2.70c
Plain Wire, base	2.25c	2.20c	2.20c	2.25c	2.25c	2.25c	2.25c	2.25c	2.40c	2.45c	2.45c	2.45c
Hoops, base	1.95c	1.85c	1.80c	1.95c	2.05c	2.35c	2.45c	2.55c	2.75c	2.90c	2.90c	2.80c
Bands base	1.75c	1.75c	1.70c	1.85c	2.05c	2.35c	2.45c	2.55c	2.75c	2.90c	2.90c	2.80c
Structural Rivets	2.25c	2.00c	2.00c	2.05c	2.20c	2.35c	2.40c	2.45c	3.00c	3.00c	3.00c	3.00c
No. 28 Black Sheets	3.00c	3.00c	3.00c	3.10c	3.15c	3.15c	3.15c	3.25c	3.40c	3.50c	3.35c	3.25c
No. 10 Blue Annld. Sheets	2.25c	2.25c	2.25c	2.35c	2.40c	2.40c	2.40c	2.45c	2.50c	2.60c	2.60c	2.50c
No. 28 Galvanized Sheets	4.00c	4.00c	4.00c	4.10c	4.15c	4.15c	4.15c	4.25c	4.40c	4.50c	4.35c	4.35c
Tin Plate per base box	$4.75	$4.75	$4.70	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75

OLD MATERIAL

Heavy Melting Steel	$14.50	$13.95	$14.95	$16.35	$17.00	$17.40	$16.60	$17.10	$19.50	$21.35	$20.40	$20.00
Low Phosphorus	17.50	17.10	17.10	18.60	20.00	20.60	21.00	20.60	22.90	24.85	25.00	24.50
No. 1 Cast	16.00	16.00	16.40	17.25	18.50	18.70	19.15	19.00	21.75	23.35	23.30	22.50

Average Monthly Prices of Leading Materials at Chicago

PIG IRON

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Lake Superior Charcoal	$31.50	$30.50	$26.90	$26.50	$28.40	$30.00	$31.65	$33.75	$36.15	$36.15	$36.15	$36.15
Northern No. 2 Foundry	19.00	18.90	20.00	20.50	22.60	23.25	24.65	28.60	32.00	31.75	30.60	28.00
Southern No. 2 Foundry	22.70	22.00	21.75	22.40	23.85	25.15	24.50	25.80	30.25	34.00	30.40	29.01
Malleable	19.00	18.90	20.00	20.50	22.60	23.25	24.65	28.60	32.00	31.75	30.60	28.00

ROLLED PRODUCTS

Bar Iron	1.61c	1.60c	1.58c	1.63c	1.67c	1.74c	1.80c	1.98c	2.25c	2.50c	2.50c	2.35c
Rail Steel Bars	1.58c	1.50c	1.50c	1.56c	1.65c	1.65c	1.70c	1.80c	1.93c	2.00c	2.00c	2.00c
Steel Bars	1.60c	1.52c	1.56c	1.60c	1.65c	1.75c	1.75c	1.88c	1.98c	2.00c	2.00c	2.00c
Structural Shapes	1.63c	1.52c	1.58c	1.60c	1.65c	1.75c	1.75c	1.90c	2.08c	2.10c	2.10c	2.10c
Plates	1.60c	1.52c	1.58c	1.63c	1.65c	1.75c	1.75c	1.90c	2.08c	2.10c	2.10c	2.10c
Sheets No. 28 Black	3.38c	3.38c	3.38c	3.49c	3.53c	3.53c	3.43c	3.58c	3.64c	3.64c	3.62c	3.62c

OLD MATERIAL

No. 1 Railroad Wrought	$11.80	$11.65	$12.25	$13.25	$14.35	$14.20	$15.20	$16.35	$19.95	$20.38	$18.10	$17.00
Heavy Melting Steel	11.20	11.15	12.05	13.55	14.65	14.45	15.15	15.80	18.15	18.50	17.40	16.75
Rails for Rolling	12.50	11.50	12.85	14.25	15.50	15.40	16.00	16.75	19.40	20.50	18.90	18.00
Car Wheels	15.25	14.65	15.90	18.15	18.80	18.25	18.90	20.40	23.50	24.75	24.60	23.75
No. 1 Cast	14.00	14.50	15.10	16.15	17.40	17.30	17.65	19.70	23.80	24.00	22.90	22.00

Average Monthly Prices of Leading Materials in the East

PIG IRON

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Basic, Eastern Pennsylvania	$20.25	$19.84	$19.90	$21.70	$24.55	$25.25	$26.00	$29.50	$30.00	$30.25	$28.00	$27.65
No. 2X Foundry, Philadelphia	21.55	21.35	21.24	23.60	25.60	27.20	27.90	32.15	34.25	33.00	30.50	28.76
No. 2X Virginia, furnace	21.75	22.00	22.50	22.60	23.50	24.50	26.00	26.00*	33.00	33.00	31.40	27.75
Standard Low Phosphorus, Phila	35.00	34.00	34.00	34.00	35.35	35.35	35.15	38.02	40.00*	40.00*	40.00*	40.00*
Standard Gray Forge, Eastern Pa	20.65	20.25	20.00	21.75	24.80	25.50	26.10	29.30	32.00	31.25	28.90	28.00

ROLLED PRODUCTS

Tank Plates, base, Philadelphia	1.81c	1.76c	1.76c	1.91c	1.96c	2.01c	2.05c	2.35c	2.55c	2.45c	2.35c	2.25c
Structural Shapes, base, Phila	1.81c	1.76c	1.76c	1.91c	1.96c	2.01c	2.05c	2.35c	2.35c	2.35c	2.35c	2.25c
Steel Bars, base, Philadelphia	1.86c	1.76c	1.76c	1.91c	2.96c	2.01c	2.25c	2.25c	2.35c	2.35c	2.35c	2.35c
Bar Iron, common base, Phila	1.86c	1.76c	1.76c	1.86c	1.96c	1.96c	2.00c	2.15c	2.35c	2.35c	2.35c	2.30c
Sheets No. 10 Blue Annld., Phila	2.61c	2.61c	2.61c	2.66c	2.76c	2.76c	2.75c	2.85c	2.95c	3.05c	2.95c	2.85c
Billets, Open Hearth, Philadelphia	$33.74	$33.74	$33.74	$35.24	$38.04	$40.74	$40.17	$40.67	$45.17	$45.17	$45.17	$43.67

OLD MATERIAL—Delivered Eastern Pennsylvania

No. 1 Heavy Melting Steel	$11.75	$12.25	$13.15	$14.35	$15.15	$15.30	$15.00	$15.25	$17.10	$18.00	$16.70	$16.00
No. 1 Railroad Wrought	15.50	15.50	15.60	15.85	17.00	17.50	18.25	18.25	21.25	22.50	21.20	19.00
No. 1 Heavy Cast	17.25	17.00	17.30	17.60	18.30	19.00	18.85	19.00	21.25	24.00	22.20	20.00

* Nominal, no market. British copper-free low phosphorus iron sold in August at $29.75 to $31.75, Atlantic tidewater; in September $29.25 to $31.25; in October, $28.75; to $30.75 in November, $28 to $29, all duty paid.

Pig Iron Trade Regains Stamina

Weathers Two Serious Strikes, with Output for 1922 60 Per Cent Over 1921 —Foreign Sales and Increased Consumption Are Leading Features—Prospects for 1923 Are Encouraging

DESPITE the fact that last year, two of the most disastrous and costly strikes of industrial history exercised a decidedly deterrent influence upon the pig iron market, much of the ground lost through curtailed production the year before was regained. This constitutes the outstanding feature of the 1922 market, since with fuel supplies interfered with for three months and practically cut off for an additional 60 days, and with transportation facilities interrupted periodically all year, but particularly the last half after the rail strike, pig iron production was able to show a gain of 60 per cent over 1921. This takes into account an estimate of 26,650,000 tons as the output for 1922, as compared with 16,500,000 tons, the total production for 1921 or the lowest point in history. After February, production gains were recorded each month up to and including July which with 2,403,030 tons made was the best month since January, 1921. The combined coal and railroad strikes dealt their blow in August, since production then dwindled to 1,810,665 tons. This increased slightly in September, rose to 2,629,655 tons in October, the best month since December, 1920; went to 2,845,595 tons in November, a trifle under the average monthly production for 1920.

As indicated by compilations of average monthly prices, the highest levels prevailed in September and October. January started with basic at $18.25; bessemer $19.25; No. 2 foundry, $19 to $20; malleable, $19.50 to $20; low phosphorus copper-free, $33.50 to $34. February levels in many cases were lower; advances were more or less steady until September; in a few cases they fell off in October; further weakness developed in November; and early in December a selling drive was inaugurated mostly for first quarter 1923 consumption. This movement in all sections of the country netted an estimated booking of all grades of approximately 750,000 to 1,000,000 tons. Following that, prices stiffened slightly and in the last half of December they were from 50 cents to $1 per ton higher than during the first two weeks.

The course of valley basic is fairly indicative of the general trend. The second quarter opened with this grade at $18.25 to $18.50 and week by week it advanced 50 cents to $1 per ton until $25 was obtainable in May and June. Some resale basic appeared early in July which temporarily weakened the producer's market but the last week of July found $25 firm again. Resale offerings were far less numerous than in 1921. In August price advances again started until in September the market became quotable at around $32. As high as $34 and $35 was quoted and in the case of some small tonnages was secured, but in September a 2000-ton lot carried a $32.50 figure. The latter part of September more steelworks furnaces entered the market, one western Pennsylvania interest commencing to quote around $30 booking considerable tonnage. This character of competition became keen and the order of the second quarter was reversed—prices commenced to fall off 50 cents to $1 per ton each week until in November $25 to $27 were the market levels. In December, further reductions took place and tonnages were closed at $24.25 and $24.50.

Similar fluctuations were recorded by the other grades, including bessemer, ferrosilicon and silveries. Bessemer iron selling on a valley basis rose from $19.25 in January to $25 in June and July; $30 in August, $35 in September, dropped to $33 in October, $31 in November, $30 in early December, and finally with tonnages taken at $29 f.o.b. Johnstown, Pa., valley producers went to $27.50. The price of No. 2 foundry throughout the first quarter remained close to $19. In April it was increased to $22 and for the next three months $24 to $25 was obtained, but in August as high as $30 and $33 were the usual market prices. In September, lower price levels commenced to be quoted, led by steelmakers, and in October and November declines became a matter of weekly record until in December, $25 and even $24.50 became prevalent. The record in malleable was substantially the same. In connection with the different grades of foundry iron, the regular 50 cents per ton additional for each 50 points of silicon were obtainable all through the year, except possibly in January. Only in rare instances were they set aside. In fact, from $1 to $2 extra for the higher silicon irons were quoted and received, particularly in eastern Pennsylvania, during the period of restricted production in the third quarter. Low phosphorus copper-free iron sold in January at $33.50 to $34, valley, but the first quarter ended with $30 to $31 quoted as regular market levels. In May the price advanced to $32 and in June and July to $34. By August $38 was quoted and in September it advanced $1 but fell off again in October to $37 to $38 while in November and December around $36 to $37 was quoted.

Average selling prices in the valley on basic and bessemer, as compiled by W. P. Snyder & Co., reveal that in May, bessemer instead of selling at higher levels than basic (the standard ratio of increase over a period of 10 years as developed for the war industries board was 10 per cent) sold at lower figures. In June, $25 was the average sales price of both grades. Other comparisons for this year and last follow:

MONTHLY PIG IRON AVERAGES

	—Bessemer—		——Basic——	
	1922	1921	1922	1921
January	$19.594	$32.00	$18.187	$30.00
February	19.50	27.00	17.75	25.00
March	19.38	26.20	18.00	24.50
April	20.543	25.00	19.30	22.50
May	24.40	24.25	24.91	21.875
June	25.00	23.00	25.00	20.70
July	25.00	20.875	24.56	18.802
August	28.67	20.00	25.41	18.33
September	33.50	20.00	32.93	19.25
October	33.50	20.00	30.00	19.00
November	31.75	20.00	27.60	19.00
December	*29.37	20.00	*24.58	18.687
Yearly average	$25.85	$23.194	$24.019	$21.470

*Estimated.

Eastern Pennsylvania foundry iron started at $20 in January for the No. 2 grade, rose in April to $24 and in June to $25. It was purchased at $26 to $28 the following month, rising as high as $30 in August and $34 in September, but declined in October to $30, in November to $29, going to $27 in December. Virginia iron did not become much of a factor until the latter part of the year when in October iron commenced to be produced there for the first time in more than two years. Quotations were based on $32 for the No. 2 grade, plus $1 silicon differentials. These declined to $28 in December with 50-cent differentials.

Large tonnage transactions as usual were peculiar to the radiator, sanitary ware and cast iron pipe manufacturers, as well as electrical companies and automobile foundries. These closed on all the way from 5000 to 70,000 tons at a time. As compared with 1921, however, these were more numerous since consumption in every district of the country was on at least a 50 per

Prices of Representative Grades of Pig Iron

1913-1922

LAKE SUPERIOR CHARCOAL IRON, CHICAGO

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$31.50	$30.50	$26.90	$26.50	$28.40	$30.00	$31.65	$33.75	$36.15	$36.15	$36.15	$36.15
1921	40.25	38.50	38.50	38.50	38.50	38.50	36.87	34.30	33.25	32.50	32.25	31.50
1920	48.75	55.65	57.50	57.50	57.50	57.50	57.50	57.50	58.30	58.50	58.50	53.50
1919	38.70	38.70	38.70	33.25	31.75	31.75	31.75	32.75	32.75	33.15	35.50	41.00
1918	37.50	37.50	37.50	37.50	37.50	37.50	37.70	37.70	37.70	37.70	38.70	38.70
1917	33.75	34.50	37.55	42.25	49.25	51.80	59.50	59.50	59.50	48.50	37.50	37.50
1916	19.25	19.50	19.75	19.75	19.75	19.75	19.75	19.75	19.75	20.35	21.95	31.75
1915	15.75	15.75	15.75	15.75	15.25	15.25	15.75	15.75	15.95	16.25	17.50	19.25
1914	15.50	15.50	15.50	15.50	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75
1913	18.25	18.00	18.00	18.00	18.00	16.75	16.75	15.00	15.00	15.75	15.50	15.50

VIRGINIA NO. 2X FURNACE

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$21.75	$22.00	$22.50	$22.85	$23.50	$24.50	$26.00	$26.00	$33.00	$33.00	$31.40	$27.75
1921	34.50	31.25	28.05	27.10	27.00	26.00	24.50	24.00	23.00	23.25	22.80	22.50
1920	41.25	42.75	43.25	44.25	45.75	46.25	46.75	49.25	50.25	49.75	45.75	42.05
1919	35.25	33.00	31.56	28.45	27.50	26.50	26.50	28.25	29.25	30.35	33.40	38.25
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	37.50	38.00	38.00
1917	26.50	28.25	34.25	38.30	41.00	46.50	52.25	51.90	46.50	33.50	33.50	33.50
1916	17.25	18.00	18.25	18.50	18.50	18.50	18.50	18.50	17.50	18.50	23.75	27.00
1915	12.50	12.50	12.50	12.50	12.50	12.50	12.50	13.00	13.50	14.00	15.50	17.00
1914	12.75	12.75	12.75	12.75	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50
1913	16.00	15.50	15.50	15.00	14.50	13.75	13.00	13.00	13.00	13.00	13.00	12.75

SOUTHERN NO. 2, BIRMINGHAM

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$16.15	$19.25	$15.25	$16.00	$17.60	$18.50	$18.50	$20.70	$26.25	$27.40	$24.00	$22.50
1921	33.75	27.70	25.10	23.00	22.50	21.70	20.25	19.00	19.00	19.00	18.25	17.00
1920	38.20	40.00	40.00	40.00	42.00	42.30	42.30	42.00	42.00	42.00	39.50	38.00
1919	31.00	31.00	30.00	26.75	26.25	25.25	25.00	26.75	26.75	27.45	30.65	35.15
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	35.25	35.25	25.25
1917	23.00	24.50	28.00	35.80	35.75	35.75	46.00	48.00	43.50	33.50	33.50	33.50
1916	14.50	14.65	15.00	15.00	15.00	14.45	14.00	13.60	14.40	15.15	19.60	23.00
1915	9.50	9.50	9.40	9.35	9.75	9.55	9.60	11.00	11.30	11.75	13.15	14.20
1914	10.50	10.50	10.60	10.50	10.50	10.45	10.05	10.00	10.00	10.00	9.90	9.50
1913	13.70	13.50	13.00	12.50	11.75	10.60	10.50	11.00	11.00	11.00	10.75	11.00

NO. 2X FOUNDRY, PHILADELPHIA

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$21.75	$21.35	$21.24	$23.75	$25.60	$27.20	$27.90	$32.15	$34.25	$33.00	$30.50	$28.76
1921	35.00	31.00	27.40	26.25	26.10	26.00	23.50	21.00	21.40	22.00	22.50	22.10
1920	43.90	45.00	45.68	46.80	46.90	46.90	48.55	50.95	53.75	52.625	46.75	38.95
1919	36.15	36.15	35.10	31.90	30.10	29.60	29.50	29.60	29.95	32.00	35.85	40.75
1918	34.25	34.25	34.25	34.25	34.25	34.25	34.50	34.50	34.50	38.85	39.15	39.15
1917	30.50	31.75	36.90	41.75	43.35	47.50	54.35	53.40	47.80	34.00	34.00	34.00
1916	19.75	20.00	20.00	20.75	20.50	19.75	19.75	19.75	19.75	20.50	25.25	30.00
1915	14.25	14.25	14.25	14.25	14.00	14.25	14.50	15.25	16.25	16.50	17.50	19.25
1914	14.75	15.00	15.00	15.00	14.75	14.75	14.75	14.75	14.75	14.50	14.25	14.25
1913	18.25	18.00	17.75	17.50	17.00	16.25	15.50	15.75	16.00	15.75	15.50	15.00

NO. 2X FOUNDRY, BUFFALO

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$19.80	$19.15	$18.30	$20.75	$23.00	$23.85	$25.35	$31.50	$33.75	$31.50	$27.85	$26.00
1921	33.75	31.25	28.25	26.75	26.25	23.85	21.75	21.25	21.05	20.40	20.00	20.00
1920	41.50	44.60	45.15	46.25	46.25	46.25	46.25	48.75	51.25	51.25	46.00	48.25
1919	32.25	32.25	31.45	28.00	28.00	28.00	28.00	28.70	28.75	29.90	34.45	39.50
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	35.25	35.25	35.25
1917	35.00	35.00	38.15	40.00	42.75	49.15	53.50	54.00	49.05	33.50	33.50	33.50
1916	18.50	18.60	18.85	19.15	19.00	18.75	18.75	18.75	18.90	20.70	26.65	33.65
1915	13.15	13.05	12.55	12.75	12.75	12.75	12.80	13.70	15.15	15.80	16.70	18.00
1914	13.00	13.00	13.75	13.90	13.50	13.05	13.05	13.20	13.25	12.60	12.45	13.10
1913	17.25	17.00	17.00	16.50	15.50	14.75	14.00	14.00	14.25	14.00	14.00	14.00

SOUTHERN OHIO NO. 2

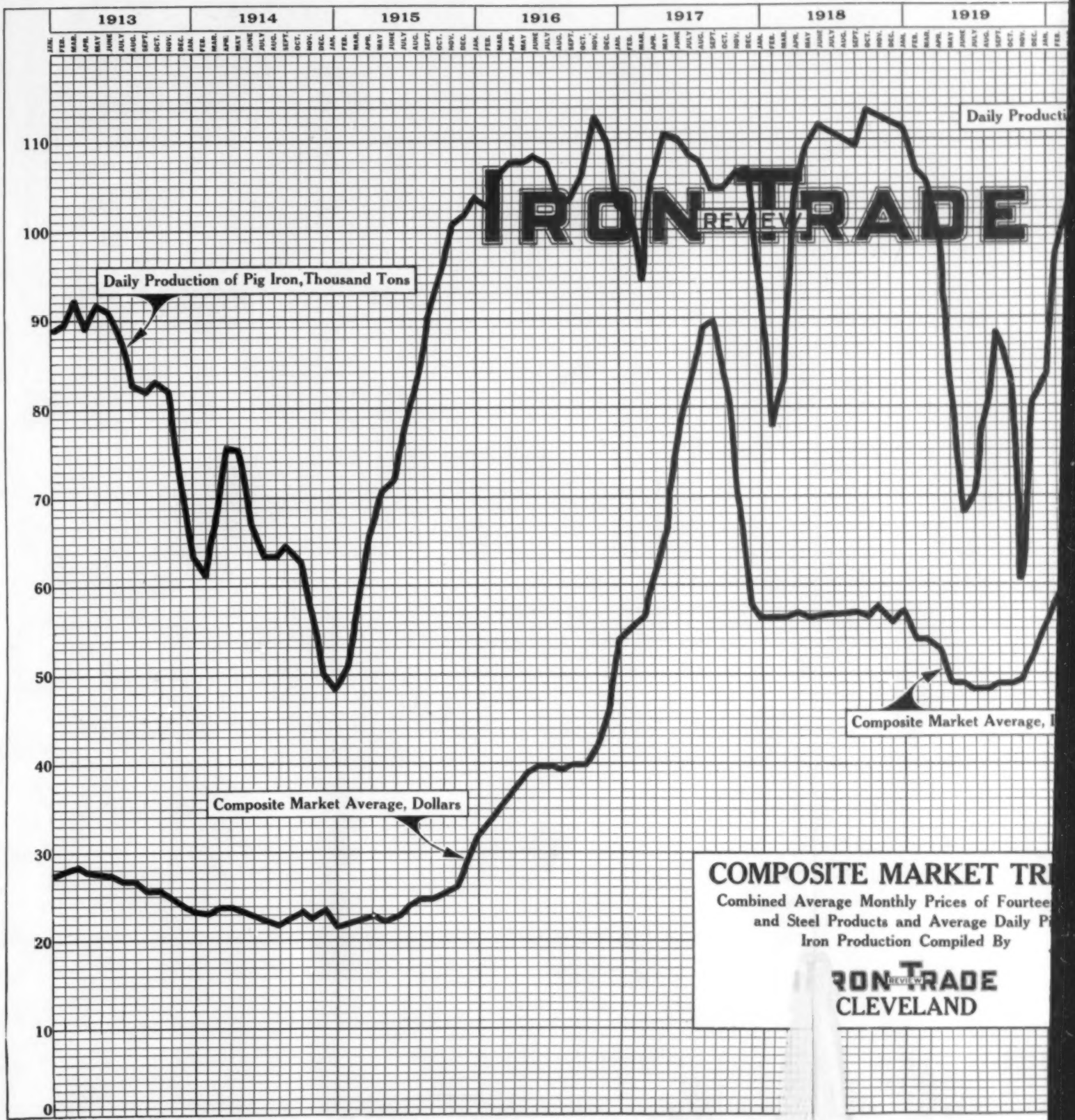
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$19.60	$19.15	$19.00	$20.30	$22.70	$23.25	$24.15	$27.00	$33.75	$32.40	$29.25	$27.01
1921	34.60	30.00	27.50	25.85	24.50	22.80	20.50	20.15	20.30	21.00	20.50	20.00
1920	39.50	43.00	43.25	43.25	44.00	44.00	44.00	46.50	46.80	46.00	44.00	37.25
1919	31.00	31.00	29.95	26.75	26.75	26.75	26.75	26.75	26.75	28.80	31.75	36.55
1918	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	34.00	34.00
1917	30.00	30.75	35.80	37.75	41.20	47.50	54.50	55.00	49.25	33.00	33.00	33.00
1916	18.30	18.50	18.30	18.50	18.50	18.15	18.44	18.40	18.13	19.38	24.00	30.00
1915	12.75	12.75	12.75	12.75	12.56	12.50	12.60	13.63	14.20	14.88	16.13	17.00
1914	13.00	13.00	13.25	13.50	13.50	13.50	13.00	13.50	13.00	13.00	12.63	12.63
1913	17.90	17.51	17.20	16.83	16.20	15.89	15.40	15.20	15.20	14.76	14.70	13.50

cent higher scale. For this reason contracting ahead for pig iron supplies was more prevalent in 1922 than in the preceding 12-month period, although at various times tonnages were closed on a monthly basis.

Last year, as in 1921, steelworks furnaces exercised more or less of an influence upon the market but in the main were content to be governed in their price policies by the going market levels quoted by merchant producers. One eastern Pennsylvania interest with a freight rate to Pittsburgh common points the same as from the valley, became an active factor in the Pittsburgh district, valley producers retaining their advantage on shipments points west of that city. It gathered in a large backlog of business in September and October, finding it necessary at the start of its campaign to offer price concessions on basic, bessemer, malleable and No. 2 foundry.

In 1922 sellers of foreign iron reaped the benefit of restricted domestic production. This activity by producers abroad became particularly noticeable in Philadelphia, Boston and New York because of the reason that to deliver iron inland automatically increased the price by the amount of freight rate involved. From that time forward, English, Scotch, French and Belgian iron arrived at more or less regular intervals. Sales aggregated from 5000 to 20,000 tons weekly in the third quarter, when because of the curtailed domestic production prices of from 50 cents to $1 per ton over American prices could be obtained. In the last quarter, however, it became more and more difficult for sellers of foreign iron to book tonnages even at equal figures. Total sales of foreign iron to this country in 1922 were approximately 300,000 tons.

Contemplation of another year affords producers considerable encouragement. The high producing and selling rate with which 1922 ended promises to continue. All consuming lines apparently are planning ever-increasing programs and barring unforeseen contingencies iron production in 1923 will approximate if not exceed the highest on record.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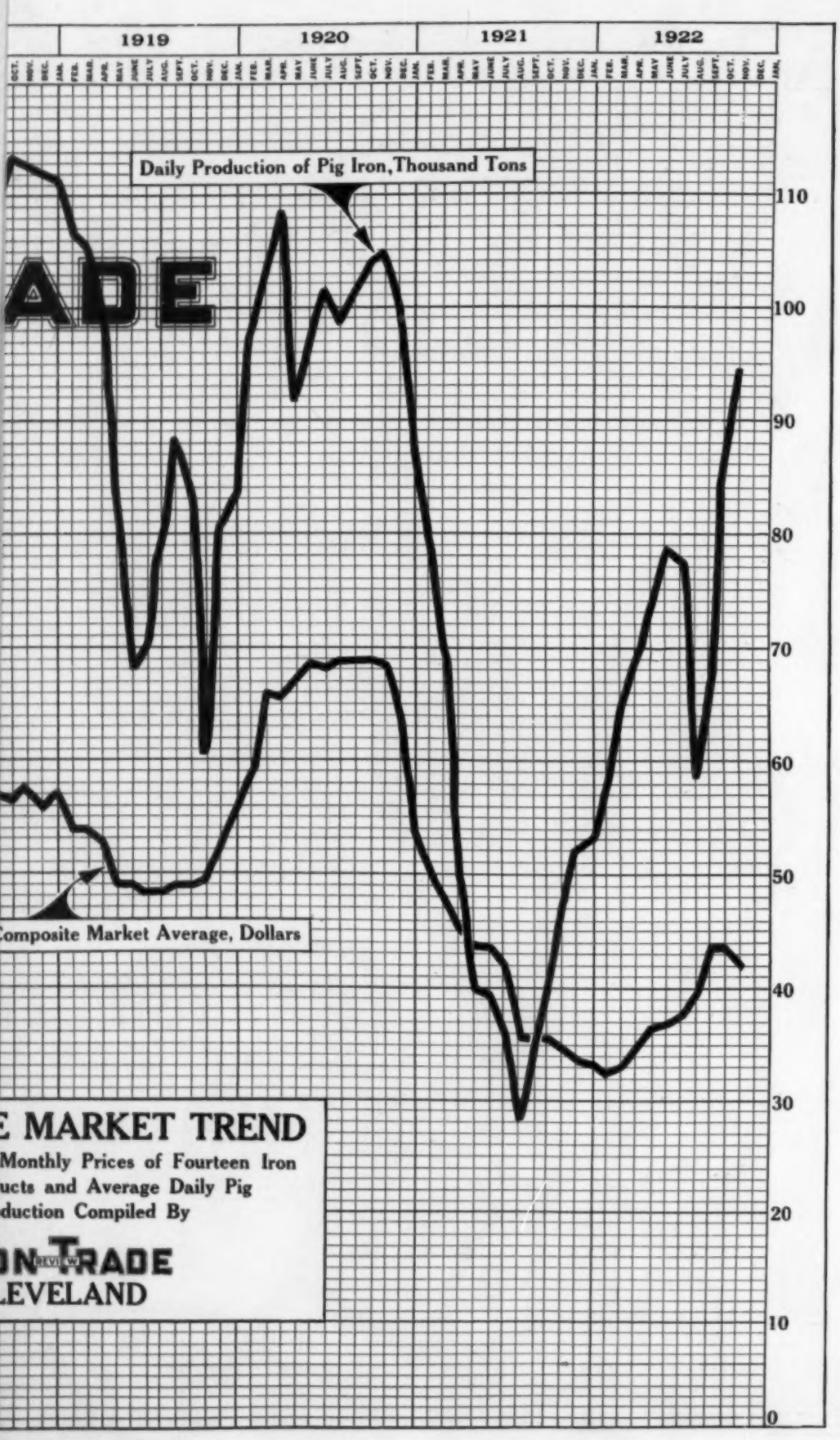

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Monthly Prices of Fourteen Iron
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ON TRADE REVIEW
LEVELAND

Prices of Representative Grades of Pig Iron

1913-1922

MALLEABLE, CHICAGO

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$19.00	$18.90	$20.00	$20.50	$22.60	$23.25	$24.65	$28.60	$32.00	$31.75	$30.60	$28.25
1921	33.25	29.00	26.25	24.75	23.50	21.20	19.15	19.40	21.75	21.20	21.00	20.00
1920	40.50	42.75	43.50	43.50	43.50	43.50	44.90	46.50	46.50	46.50	43.00	37.50
1919	31.50	31.50	30.44	27.25	27.25	27.25	27.25	27.25	27.25	28.00	32.25	38.80
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	34.50	34.50	34.50
1917	30.00	31.25	35.80	39.00	43.20	50.50	55.00	55.00	49.50	33.35	33.50	33.50
1916	19.00	19.00	19.00	19.50	19.50	19.50	19.50	19.50	19.15	19.50	25.00	29.25
1915	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.40	14.20	15.10	17.40	18.00
1914	14.25	14.25	14.25	14.25	14.25	14.25	14.00	14.00	13.50	13.50	13.00	13.00
1913	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.40

BASIC, PITTSBURGH

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$20.31	$19.81	$19.86	$22.21	$26.46	$26.96	$26.76	$27.96	$34.27	$32.37	$29.77	$26.77
1921	31.46	28.71	26.56	24.81	23.96	23.16	20.81	20.96	21.56	21.16	20.96	20.71
1920	39.20	43.65	44.40	44.40	44.65	45.15	47.40	49.40	50.45	47.21	39.46	34.96
1919	31.40	31.40	30.35	27.15	27.15	27.15	27.15	27.15	27.15	27.15	30.40	35.40
1918	33.95	33.95	33.95	32.95	32.95	33.20	33.40	33.40	33.40	43.40	34.40	34.40
1917	30.95	30.95	32.85	39.20	42.14	50.20	53.20	52.75	43.95	33.95	33.95	33.95
1916	19.20	18.77	19.20	19.20	18.95	18.95	18.95	18.95	19.08	20.83	25.95	30.95
1915	13.45	13.45	13.45	13.45	13.45	13.54	13.83	14.89	15.65	15.95	16.70	18.55
1914	13.42	14.09	13.96	13.90	13.90	13.90	13.90	13.90	13.90	13.75	13.45	13.45
1913	17.40	17.29	17.03	16.77	16.15	15.46	15.25	15.07	15.09	14.85	14.09	13.65

BESSEMER, PITTSBURGH

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$21.51	$21.31	$21.21	$22.46	$26.46	$26.96	$26.76	$29.16	$35.27	$35.12	$33.77	$30.27
1921	33.96	30.96	28.96	27.46	26.06	25.06	22.96	21.96	22.46	22.06	21.96	21.96
1920	40.00	43.15	43.40	43.50	43.90	44.25	46.80	49.50	50.45	50.17	42.33	36.96
1919	33.60	33.60	32.55	29.35	29.35	29.35	29.35	29.35	29.35	29.35	32.00	36.65
1918	37.25	37.25	37.25	36.15	36.15	36.40	36.60	36.60	36.60	36.60	36.60	36.60
1917	35.95	35.95	37.45	42.20	44.95	55.20	57.95	55.55	48.27	37.25	37.25	37.25
1916	21.32	21.45	21.55	21.95	21.95	21.95	21.95	21.95	22.20	24.33	30.35	35.95
1915	14.70	14.63	14.55	14.55	14.55	14.58	14.88	15.89	16.80	16.95	17.45	19.70
1914	15.00	15.09	15.15	14.90	14.90	14.90	14.90	14.90	14.90	14.85	14.70	14.70
1913	18.15	18.15	18.15	17.92	17.90	17.26	16.65	16.52	16.65	16.60	16.09	15.90

BASIC EASTERN, PENNSYLVANIA

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$20.25	$19.84	$19.90	$21.70	$24.55	$25.25	$26.00	$29.50	$30.00	$30.25	$28.00	$27.65
1921	33.35	29.95	26.20	25.00	25.00	24.70	22.25	20.70	19.50	20.50	20.90	20.25
1920	39.75	40.50	43.00	43.70	44.00	44.05	44.10	47.45	51.15	50.75	44.55	34.75
1919	33.90	33.90	32.85	29.65	28.80	25.50	26.60	27.00	27.00	27.90	33.00	35.75
1918	33.90	33.90	33.90	32.90	32.90	32.90	32.90	32.90	32.90	36.60	36.90	36.90
1917	30.15	30.50	33.80	38.25	40.80	46.40	50.75	51.00	46.50	33.50	33.50	33.50
1916	19.50	19.50	20.00	20.50	20.00	19.25	19.00	19.25	20.00	21.00	25.50	30.50
1915	13.50	13.75	14.00	13.25	13.50	13.50	13.75	15.25	17.25	17.50	17.75	18.00
1914	14.00	14.25	14.25	14.25	14.00	14.00	14.00	14.00	14.00	14.00	13.50	13.50
1913	18.25	18.00	17.50	16.50	16.50	16.00	15.25	15.00	15.25	15.25	15.00	14.25

STANDARD LOW PHOSPHORUS, PHILADELPHIA

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$35.00	$34.00	$34.00	$34.00	$35.35	$35.35	$35.15	$38.02	$40.00	$40.00	$40.00	$40.00
1921	47.72	46.82	46.82	44.17	43.32	43.32	43.32	43.32	43.32	43.32	43.32	35.32
1920	51.60	53.55	53.80	53.80	54.80	60.20	57.80	59.60	65.30	65.30	*65.30	*65.30
1919	51.00	51.00	49.90	46.75	45.80	42.25	41.10	40.25	40.25	40.35	43.00	47.50
1918	55.50	55.50	55.50	55.50	55.50	55.50	56.00	56.00	56.00	57.00	57.00	57.00
1917	54.50	57.50	66.70	75.50	77.00	85.00	92.50	92.50	82.00	55.50	55.50	55.50
1916	32.00	32.00	32.00	33.00	34.00	34.00	33.00	33.00	34.00	40.00	46.00	55.00
1915	19.00	19.00	20.00	20.00	20.00	20.50	21.50	23.50	24.50	28.00	30.00	32.00
1914	21.00	21.00	21.00	21.00	21.00	20.50	20.50	21.00	21.00	21.00	19.00	19.00
1913	24.50	24.50	24.00	23.50	23.50	23.50	23.50	23.00	23.00	23.00	21.50	21.00

MALLEABLE, VALLEY

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$19.45	$19.00	$19.00	$20.35	$23.75	$24.50	$25.00	$28.60	$34.00	$32.30	$29.25	$26.00
1921	32.00	28.75	26.40	25.00	24.10	22.60	20.40	19.00	20.90	20.25	20.00	20.00
1920	38.93	41.60	42.35	41.60	41.60	41.85	43.40	48.25	50.50	48.25	40.35	36.00
1919	31.50	31.50	30.45	27.25	27.25	27.25	27.25	27.25	27.25	27.75	31.75	36.40
1918	33.50	33.50	34.45	34.45	34.45	34.65	34.90	34.90	34.90	34.50	34.50	34.50
1917	31.00	33.50	36.00	39.00	42.70	50.10	53.00	54.60	49.60	34.25	33.50	33.50
1916	19.00	18.65	18.50	18.50	18.50	18.50	18.50	18.50	18.55	20.13	25.81	30.75
1915	12.75	12.75	12.85	12.50	12.50	12.50	12.65	13.75	14.50	14.62	15.50	17.90
1914	13.15	13.19	14.15	13.25	13.25	13.00	13.00	13.00	13.00	12.90	12.75	12.75
1913	17.25	17.19	16.75	15.75	14.85	14.38	14.15	14.00	14.06	14.25	13.87	13.50

* Nominal.

Coke By-Products Prices Hold Firm

MARKED steadiness in prices, but highly unsettled conditions with regard to production and distribution were the outstanding features of the coal tar products market in 1922. First quarter demand for refined benzols, toluol and solvent naphtha was confined to needs of manufacturers, mostly for motor fuel. Slight improvement was noted in the second quarter. In the third quarter, the coal shortage and the transportation difficulties made it impossible for sellers to meet requirements. The last quarter showed

(*Concluded on Page* 118)

Coal Tar Products Market in 1922

Producers prices, f. o. b. works

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Benzol	$0.29	$0.29	$0.29	$0.29	$0.29	$0.30	$0.30	$0.30	$0.30	$0.30	$0.30	$0.30
Toluol	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Solvent naphtha	0.25	0.25	0.25	0.25	0.25	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Phenol	0.15	0.15	0.15	0.15	0.15	0.20	0.20	0.20	0.21	0.22	0.22	0.22
Naphthalene flakes	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06
Naphthalene balls	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07
Spot sul. of am'o'a	$2.25	$2.37	$2.60	$2.65	$2.67	$2.72	$2.82	$2.82	$2.90	$3.05	$3.07	$3.12

Coke Output Increases in Year

Beehive and By-Product Production Exceeds 1921 Despite Rail and Coal Strikes and Car Shortages—Foundry Grade Soars from $3.50 in January to $18 in August—Furnace Fuel Parallels

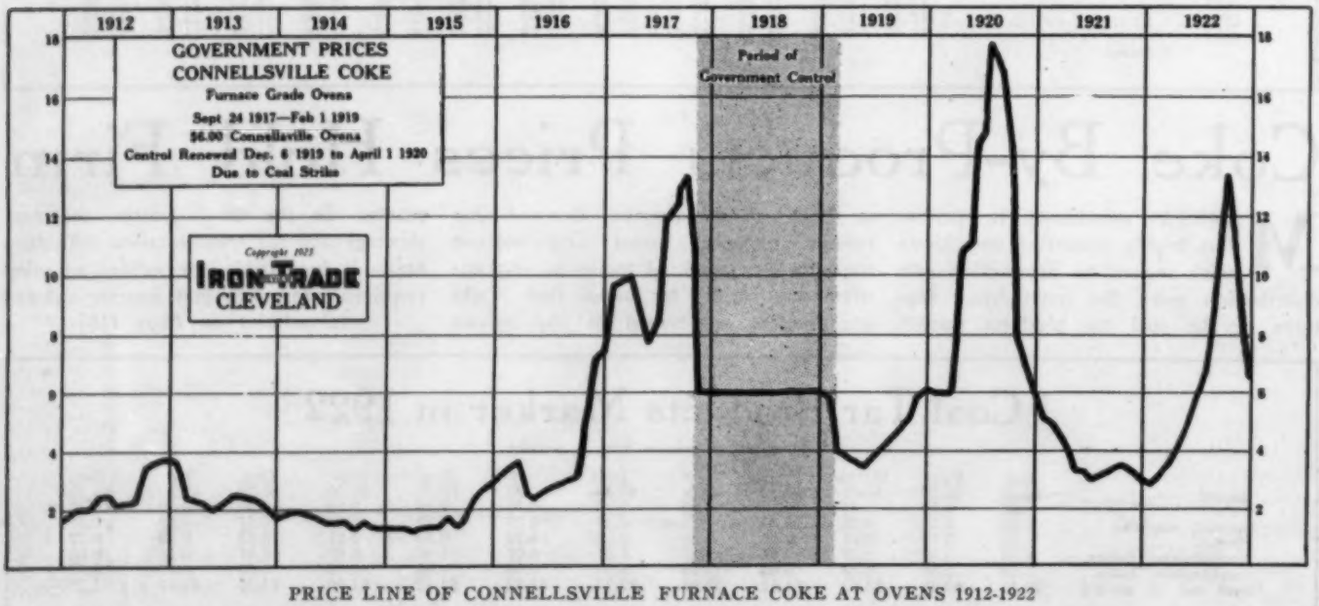
BY REASON of its close affiliation with coal, the beehive coke industry was perhaps the first to feel the effects of the coal strike of April 1. By the same token the effect upon it was more severe and extended over a longer period than in connection with any other industry. This clearly is shown by the fact that production in the Connellsville region did not resume upon a prestrike basis until the second week in October, although the low point in total production was the week of June 3 with 48,470 tons the estimated output of both merchant and furnace ovens. The low point in merchant oven production was reached the week of July 8, when 10,130 tons were produced, the total output for that week being 53,920 tons. However, even with such a disastrous coal strike, 1922 total production exceeded 1921's by approximately 2,000,000 tons; at no time did production get as low as in 1921 when from lack of demand only 18,400 tons were produced the week of July 8 by both merchant and furnace ovens.

Further demonstrative of the effect the coal strike had upon the market is the matter of prices. Furnace coke which was selling in January for $2.75, rose to $3.50 the first week in April, increasing regularly thereafter until the middle of August when $16 to $17 represented the quotable market, a net increase of in excess of $14. The $17 price was just $3 per ton below the highest price paid in a 10-year period, registered in August of 1920. Foundry coke selling the last of January at $3.50 rose to $17 to $18 by Aug. 10. The largest single advance was reported during the week of July 13 to 20, when coke went up $3 per ton. The third quarter ended with furnace coke selling at $11 to $12 and foundry at $2 higher instead of the usual differential of $1 per ton. Declines commenced to be a matter of weekly record in the last quarter until as low as $6.25 was being paid for standard 48-hour fuel early in December. A sudden demand originating in the East for coke of any description to serve as a substitute for anthracite coal sent the market up on the strength of bids for any coke suitable for domestic use, and about the middle of the month $7 became the quotable market and the year ended with furnace coke selling at $7 to $7.50, ovens.

By-product coke production also gained over that of 1921. While definite figures for 1922 will not be available for some weeks, indications are that the retort coke produced last year will be more than 25,000,000 tons, which is an increase of approximately 33 1/3 per cent over the 19,749,580 tons manufactured.

Blast furnace operations, usually a barometer in the coke trade, showed a net gain of six furnaces in April, the first month of the coal strike. Fourteen were added in May and 15 in June, bringing the total active to 202, the highest since December, 1920, when 202 furnaces were in blast. The fact that blast furnace operation failed to show the effects of the coal strike for three months after it was called is attributed partly to the foresightedness exercised in stocking up fuel against the strike emergency, and partly to the fact that until traffic conditions became congested it was easily possible to get coal for coking purposes from Virginia, West Virginia and Kentucky. Congestions became so severe that by July 20 this source became tied up as well. The fourth month of the coal strike, July, was when the combined effects of the two strikes began to be felt; 26 furnaces went out, followed by 36 more in August. Recovery then was rapid since in September 45 stacks resumed, the largest gain since the steel strike of 1919, when in October of that year 53 stacks had the torch applied. In October, 29 additional furnaces were placed in blast and in November, 22 went in, bringing November pig iron production to a total which was the highest monthly output since November of 1920.

Early in the first quarter considerable of the beehive coke produced was sold for other than blast furnace use, a dearth of inquiry from that source being noted. Some coke operators rather than sell coke at the then prevailing market price of $3, preferred to sell coal at $2 which they stated was equivalent to $3.75 coke. Two or three furnaces usually buying beehive coke had turned to the by-product fuel. Shortly prior to March 31, however, Connellsville district oven opera-



PRICE LINE OF CONNELLSVILLE FURNACE COKE AT OVENS 1912-1922

Connellsville, Virginia and West Virginia Coke

Average Monthly Prices for Year 1922

	Wise County		Pocahontas		New River		Connellsville	
	Furnace	Foundry	Furnace	Foundry	Furnace	Foundry	Furnace	Foundry
January	$ 4.50	$ 5.50	$ 6.00	$ 7.00	$ 7.00	$ 8.25	$ 2.75	$ 3.85
February	4.40	5.50	5.60	6.60	7.00	7.60	2.95	3.80
March	4.35	5.65	5.50	6.50	7.00	7.45	3.25	4.05
April	4.65	5.65	5.50	6.50	7.00	7.45	4.30	4.95
May	5.25	6.25	5.50	6.50	7.00	7.75	6.00	6.50
June	5.65	6.50	5.50	6.50	7.00	7.75	6.60	7.20
July	6.75	8.20	5.80	6.90	7.40	8.95	10.65	11.40
August	11.65	13.75	9.00	9.95	9.75	14.05	13.20	14.30
September	11.75	13.50	12.25	13.50	11.50	14.50	11.00	12.75
October	10.75	12.85	11.00	13.00	11.25	14.30	10.60	12.10
November	8.15	10.25	9.40	10.65	9.50	13.00	7.10	8.40
December	6.50	7.50	*....	*....	9.50	12.00	6.25	7.50

*Nominal.

tors took on numerous contracts for April requirements of blast furnaces, not anticipating that the success of the strike would be so extensive in their region. Success of union organizers took many by surprise and by April 15 nonunion participation in the strike was most effectual. The few ovens remaining in operation under numerous difficulties were discharging a few of their contractial arrangements, leaving little or no coke for the open market. For a blast furnace operator to issue an inquiry as early as May 1 was a hopeless quest and the futility of such action began to be realized in June. Not enough free coke was being produced in the entire region to run one blast furnace. Any small excesses that did appear were snapped up by eastern gas and electric companies as a substitute for anthracite coal, production of which was also disastrously interfered with. The gas companies, used to high priced anthracite coal, could afford to pay figures on coke which were prohibitively high for blast furnace operators.

The railroad strike of July 1 served further to militate against coke shipments since it greatly hampered the spotting of cars at those coke plants which were operating in even a minor way. Coal and coke plants suffered intermittently throughout the remainder of the year from car shortages, freight embargoes, etc., directly traceable to the railroad strike. Immediately following the signing of the so-called "Cleveland" coal wage agreement, formulated at a conference in Cleveland, Aug. 15, the coke market became easier. The $16 to $17 price levels commenced to yield, although production increased but slightly. Among the first coke plants to start up was Alicia of the Pittsburgh Steel Co. about June 15, but the drifting back of men to the coal mines and coke ovens was exceedingly gradual. From the middle of August beehive coke production increased only at the rate of about 1000 tons a week until the last of September. Thereafter, with unrest among workmen increasing, more returned and weekly gains of 3000 to 8000 tons were registered until November found 1920 production records approximated. During the last part of the third quarter and the first part of the last, some blast furnaces were able to blow in by buying coke in several different directions. At one time, one or two furnaces in the Pittsburgh district were using 10 to 15 or more different makes of coke. Another feature of the strike period was the entry of the Carnegie Steel Co. into the open market for fair sized tonnages of coke and enormous tonnages of coal as well.

Beehive and by-product coke at Birmingham remained around $5 to $5.50 until July when $6 was reached and while $10 finally developed, the $9.50 quotation of early October declined from $1 to $1.50 per ton by the fore part of December. Demand in the southern district remained fairly steady and orders too were contributed from Cincinnati and St. Louis as well as from Boston and Chicago. In April, Alabama by-product fuel was offered Pittsburgh district users at $4, Birmingham with a freight rate of $5.50. The beehive market then was around $6, the Connellsville freight rate being $1.51 which possibly explains why none was sold.

The use of by-product coke by blast furnaces was perforce more extensive during 1922. One or two utilized it from choice during the first quarter and when the coal strike commenced to be talked about they exercised options renewing their contracts for the second quarter. Others turned to by-product fuel during the period of shortened beehive supplies because of the strike. The list of those ordinarily depending upon beehive fuel who substituted by-product, included such concerns as the A. M. Byers Co., the Shenango Furnace Co., the Trumbull-Cliffs Furnace Co., the Sharon Steel Hoop Co., and others. Stocks of by-product fuel in St. Louis, Cincinnati, Birmingham, Fairmont, W. Va., New England and other eastern points too, rapidly dwindled and production was utilized to satisfy blast furnace needs in those respective territories. Foreign coke sold in fairly sizable lots at prices around domestic by-product levels. In September the foreign price was less while in October they were approximately the same. In January, the Seaboard By-Products Coke Co. commenced to quote $8.59 delivered Newark, and other northern New Jersey points. By June 6, it reached $10.84 to $12.02; July saw an advance to $11.84 to $13.02, and $14.84 to $16.02 was reached in August. This range continued to be quoted well into October. November developed weakness; the price was reduced and first quarter 1923 buyers were given an opportunity to close at $12.84, delivered. Among beehive coke producers there was a tendency to avoid quarterly arrangements and efforts were being made to have their customers continue to close on a month-to-month basis. This method of buying, however, usually is distasteful to blast furnace operators and they continued to negotiate for full quarterly tonnages until the end of the year.

Connellsville Output

From *Connellsville Courier*

1922	
Dec. 2	193,770
Nov. 25	201,100
Nov. 18	182,380
Nov. 11	176,880
Nov. 4	164,320
Oct. 28	159,780
Oct. 21	146,720
Oct. 14	140,701
Oct. 7	126,350
Third quarter	1,164,720
Second quarter	967,343
First quarter	1,234,670
Indicated total 1922	2,340,000
1921	
Fourth quarter	1,010,550
Third quarter	412,370
Second quarter	533,170
Indicated total 1921	3,682,408
1920	
Fourth quarter	2,654,840
Third quarter	2,529,270
Second quarter	2,380,670
First quarter	3,105,919
Indicated total 1920	10,679,699
1919	
Fourth quarter	2,798,242
Third quarter	2,761,723
Second quarter	1,658,811
First quarter	3,039,972
Indicated total 1919	10,258,748
1918	
Fourth quarter	3,669,194
Third quarter	4,438,405
Second quarter	4,422,782
First quarter	3,485,763
Indicated total 1918	16,016,144
1917	
Fourth quarter	4,045,518
Third quarter	4,569,066
Second quarter	4,771,852
First quarter	4,471,905
Indicated total 1917	17,858,341

Semifinished Shortage Is Felt

Disturbed Fuel and Transportation Conditions Cause Lack of Rolling Material at Times—Steel Corporation Subsidiaries Are Buyers of Large Tonnages of Sheet Bars, Billets and Slabs—Wire Rods in Demand

ACCENTUATED by the coal and railroad strikes a virtual shortage of semifinished materials extended in intermittent fashion throughout 1922 but particularly in the period between April and November. During the first quarter makers and consumers alike failed to foresee the difficulties as to supplies, subsequent to April 1, and spot buying as needed ruled.

At no time in 1922 was the Carnegie Steel Co. a factor as a seller of semifinished material in the open market. At times during the last half, the shortage of steel became so pronounced with the leading interest that it could not supply the full needs of its constituent companies to say nothing about its regular outside customers. Affiliated interests had to enter the open market for billets, sheet bars and slabs. This did not develop in a sizable way until the fourth quarter and by that time the situation was so much improved among independent companies that needs were quickly met. One purchase divided among several producers involved 40,000 to 50,000 tons of sheet and tin bars as well as slabs. Another constituent company bought a similar tonnage of billets. In September, the interstate commerce commission issued orders that all open top cars were to be devoted to coal transportation to lake ports.

During the last half, particularly the last quarter, consumption of skelp and wire rods became heavy. Buyers depending upon the open market were unable to supply their requirements, except with great difficulty, and had to broadcast their inquiries.

It often was advantageous for makers to quote f.o.b. mill, instead of on a Pittsburgh or Youngstown basis. On various occasions Cleveland makers took orders for 2000 to 20,000 tons of assortments of sheet bars, billets and slabs at prices f.o.b. Cleveland. Producers in other centers adopted similar methods of quoting.

The year started with quotations at Pittsburgh and Youngstown on sheet bars, slabs and 4 x 4-inch billets at $29, $29 an $28 respectively. The latter part of March an advance of $2 was made by independents as well as the Carnegie Steel Co. For a time, various prices were named and about the middle of May all three forms were on the common level of $35. While in July the actual market was not considered over $35, up to $37.50 and $38 was quoted. Those levels openly were realized in August when the scarcity of semifinished material began to manifest itself. By September $40 became the open market quotation and contracts for fourth quarter were booked by independents on that basis. About the time all speci-

Average Monthly Prices of Semifinished Steel, 1913-1922

Per gross ton, Pittsburgh

BESSEMER BILLETS

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$29.00	$28.00	$28.30	$30.10	$34.50	$35.00	$35.00	$35.00	$39.50	$40.00	$38.80	$36.50
1921	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	29.00	29.00
1920	49.60	61.25	65.00	68.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917	60.00	62.50	67.00	72.50	85.00	93.75	100.00	93.00	73.75	58.75	47.50	47.50
1916	33.75	34.00	40.60	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	19.50	19.50	19.50	19.50	19.50	19.85	21.40	23.00	24.60	25.50	27.75	29.60
1914	20.00	21.00	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
1913	28.00	28.90	29.00	29.00	27.70	26.50	26.50	26.10	25.00	23.00	20.83	20.00

OPEN-HEARTH BILLETS

1922	$29.00	$28.00	$28.30	$30.10	$34.50	$35.00	$35.00	$35.00	$39.50	$40.00	$38.80	$36.50
1921	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	29.00	29.00
1920	49.60	61.25	66.25	70.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917	60.00	62.50	67.00	72.50	85.00	93.75	100.00	93.00	73.75	58.75	47.50	47.50
1916	34.75	35.00	40.60	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	19.50	19.50	19.50	19.50	19.50	19.85	21.50	24.00	25.60	26.50	28.00	30.20
1914	20.00	20.75	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
1913	28.70	29.40	29.50	29.50	28.10	26.50	26.50	26.10	25.00	23.00	20.85	20.00

BESSEMER SHEET BARS

1922	$30.00	$29.00	$29.40	$31.50	$35.00	$35.00	$35.00	$35.00	$39.50	$39.85	$38.80	$36.50
1921	47.50	43.00	39.60	38.75	39.00	37.40	34.00	32.00	30.40	31.50	30.00	29.25
1920	53.40	65.00	70.00	70.00	75.00	70.00	70.00	70.00	68.50	63.75	56.25	47.65
1919	47.00	47.00	45.75	42.00	42.00	41.50	40.80	42.00	42.00	43.20	45.00	48.00
1918	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
1917	60.00	62.50	67.00	72.50	88.00	101.25	105.00	96.00	82.50	65.50	51.00	51.00
1916	33.75	34.00	41.00	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	20.00	20.00	20.00	19.60	19.50	20.35	21.70	24.00	24.60	25.50	28.25	30.80
1914	21.00	22.00	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.60	19.00
1913	28.70	29.40	29.50	29.50	28.40	27.50	27.50	27.10	25.60	23.80	21.75	21.00

OPEN-HEARTH SHEET BARS

1922	$30.00	$29.00	$29.40	$31.50	$35.00	$35.00	$35.00	$35.00	$39.50	$39.85	$38.80	$36.50
1921	47.50	43.00	39.60	38.75	39.00	37.40	34.00	32.00	30.40	31.50	30.00	29.25
1920	53.40	65.00	72.50	78.00	78.75	75.00	75.00	71.25	68.50	63.75	56.25	47.65
1919	47.00	47.00	45.75	42.00	42.00	41.50	40.80	42.00	42.00	43.20	45.00	48.00
1918	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
1917	60.00	62.50	67.00	72.50	88.00	101.25	105.00	96.00	82.50	65.50	51.00	51.00
1916	34.75	35.00	41.00	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	20.00	20.00	20.00	19.60	20.00	20.35	22.00	25.00	25.80	26.50	28.50	30.80
1914	20.60	21.75	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.60	19.00
1913	29.20	29.90	30.00	30.00	28.80	27.50	27.50	27.10	25.60	23.80	21.75	21.00

fications were in the hands of makers for the last quarter, weakness began to appear and $40 could not be obtained. Soon $38 became nominal. A few small sales by Ohio makers at $37.50 mill, served to clarify the situation, although it was reported fairly large tonnages were closed at $35. The issue remained more or less clouded until the Carnegie Steel Co. announced its price for the first quarter of 1923 at $36.50, Pittsburgh. Independents then adopted the figures and sold considerable tonnage of sheet bars, 4 x 4-inch billets, and slabs. As the year ended, $36.50 was considered the market basis.

Forging billets at times commanded a premium beyond the usual $5 differential over rerolling billets. When in September billets reached $40, $47.50 was paid for forging billets. In November with a $40 nominal price on rerolling billets, from $47.50 to $50 was paid by forging billet users. In December an eastern Pennsylvania steel company sold 6000 tons at $47.50 for first quarter.

Because wire products makers needed so many wire rods in their own finishing departments they restricted their selling efforts. This forced the market upward so that in the third quarter and part of the fourth as high as $47.50 and $50 was obtainable. The American Steel & Wire Co.'s figure of $45, being nominal since it had no tonnage to offer. Wire rods in the early part of the year were quoted at $36. Early in December an independent producer took a 5000-ton lot at $45, but on smaller lots in the open market $47.50 to $50 prevailed.

Most skelp users covered their requirements in advance. During the coal strike but little skelp was available on the open market. Sheared, universal or grooved skelp rose from 1.50c to 1.60c, base Pittsburgh, in January to 1.60c to 1.75c in June, although in March some sold at 1.35c. A sale of grooved was recorded at 1.90c the latter part of June but in July the market was quoted at 1.80c. It rose by easy stages to 2.00c to 2.25c by September and while in certain instances 2.50c was obtained in the last of the third quarter, in November 2.25c openly was quoted followed by 2.15c and during the last month 2.00c again became the general market.

The year 1923 opens with a good actual and a greater potential demand in sight for the various forms of semi-finished material.

Shipments of Tin Plate Surpass Output

UNINTERRUPTED consumption and demand with output checked by car, steel, labor and fuel shortages, featured the market for tin plate in 1922. However, production will compare favorably with large production years, since ground lost in 1921, partially was regained. Estimated production for the year was in excess of 1,250,000 tons. When final tabulations are made, shipments undoubtedly will exceed production by several hundred thousand base boxes. In the case of the American Sheet & Tin Plate Co., bargoes, bringing about a restricted tin bar delivery caused a further decline and in the second week of October, only 59 per cent of its tin mills were engaged. Recovery then became more rapid, tin bar deliveries improved and in November operations in excess of 65 per cent were enjoyed. The year ended with approximately 75 per cent engaged. Several independents started the year with 100 per cent operations and maintained that level for several months. The general average, however, was 75 per cent and in the second quarter, this reached as high as 85 per cent.

While specifications furnished during the first part of the year were fairly heavy, new buying was sluggish. Some consumers pursued a hand-to-mouth policy of buying until the second quarter. After April 1, both specifications and spot buying increased. Manufacturers of food containers had placed more or less conservative tonnages.

As in 1918 and 1920, with official prices of $7.75 and $7 applying throughout the respective years, 1922 saw the $4.75 price of Nov. 3, 1921 unchanged as the official level for the entire 12 months. As formerly, large consumers received a preferential quotation; intermittent exports of tin plate were billed at lower figures, and stock list plate sold at $3 to $10 per ton below the regular market. During the second quarter, exceedingly low figures were named by independent producers, some going as low as $4.25 and $4.35. In August and regularly thereafter, however, these same producers actively recommended an advance to $5 or $5.25. On Nov. 23 the American Sheet & Tin Plate Co. announced $4.75 as the price for the first quarter of 1923 to jobbers and for the first half to manufacturers.

The year ended with the leading interest's output for the first quarter fully obligated, and with independents reluctantly closing business on the same level but suggesting $4.85 as a level interesting to them, on a $36.50 or $37.50 tin bar basis. They pointed out that the $4.75 price started with tin bars at $30 and when the latter reached $40 tin plate at the same or lower levels was being sold at a loss.

Average Monthly Prices of Tin Plate

Per base box, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75
1921	7.00	7.00	7.00	6.65	6.25	6.25	5.65	5.25	5.15	5.00	4.80	4.75
1920	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1919	7.35	7.35	7.25	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1918	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75
1917	6.875	7.00	7.50	7.50	7.90	9.25	10.00	10.00	10.00	10.00	8.20	7.75
1916	3.75	3.75	4.15	4.70	5.15	5.55	5.80	6.00	5.60	5.75	6.05	6.50
1915	3.10	3.10	3.10	3.20	3.20	3.10	3.10	3.10	3.10	3.10	3.35	3.60
1914	3.40	3.40	3.40	3.40	3.38	3.30	3.25	3.45	3.55	3.35	3.15	3.20
1913	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.55	3.50	3.40

Bar Demand Exceeds Production

Heavy Demand Rules as Year Ends—Orders Were Taken for Delivery at Mill Convenience as Consumers' Requirements Could Not Be Met—Prices Quoted Were Unprofitable—Labor Troubles Affected Production

CONFORMING to the usual course of the steel market, that of one extreme following another, soft steel bars in 1922 moved from a condition of dullness and lack of demand to a shortage which put deliveries months in the future. The preceding year had seen steel mills hungry for business and buyers apathetic. Agricultural implement makers were out of the market and railroads, though in great need of material and equipment, did not buy.

This was the condition of the steel bar market when 1922 opened. Prices were low, deliveries were prompt and consumers became accustomed to buying for a week or a month ahead. No forward contracts were being made because users preferred to buy for spot delivery. No stocks were available and accumulation of material was avoided.

First signs of a revival appeared in January, when some railroad car buying was done. This was followed shortly by increased demand from small users. Automobile builders bought for their spring production and jobbers felt the need of further supplies.

Before the first quarter had passed, the day of immediate delivery had gone and buyers awoke to the fact they must provide for future needs as the mills no longer could make prompt deliveries. Bar mills were put on full capacity, even before other finished steel had felt an equal demand. Steel warehouses, ever quick to sense the future, bought heavily. By the end of March a real buying movement in bars was under way and shortly thereafter mills refused to make contracts, accepting only specifications with orders, a practice that continued the remainder of the year. The final week in March was the best in a year as to tonnage and new bookings were greater than production.

For the remainder of the year the condition was relatively unchanged, except as to intensity and the ever-extending period of delivery. The coal strike curtailed production, the percentage falling low at midyear and increasing gradually in later months. The shopmen's strike and later the heavy movement of coal, after the mine strike ended, interfered seriously with production, which assisted in piling up unfilled orders.

Bookings continued to exceed production throughout the year and the new year is entered with little tonnage remaining unsold for first quarter delivery. While most selling of bars was for delivery at mill convenience, some producers allocated their tonnage for each quarter and guaranteed deliveries, limiting sales to regular customers in proportionate tonnages.

Several factors in addition to general demand for bars aided in piling up orders on mill books. Heavy purchases of freight cars required an unusual tonnage of bars and the automotive industry drew heavily for its needs as it carried their construction programs through the year without the usual decline toward the end. Agricultural implement makers found business better than early in the year and mild weather conditions permitted reinforced concrete construction much later than usual.

Prices did not advance in keeping with demand and production and the year was not largely profitable. Bars continued to be quoted on a Chicago as well as a Pittsburgh base, the former being about $2 per ton above the

Cold Rolled Steel Prices

Cents per pound, base Pittsburgh

	1918	1919	1920	1921	1922
January ...	17 off	21 off	3.65	3.60	2.00
February ..	17	21	3.85	3.50	1.90
March	17	23	4.00	3.15	1.85
April	17	28	4.31	3.05	1.85
May	17	28	4.10	3.10	2.00
June	17	28	4.10	2.99	2.00
July	17	*28	4.10	2.75	2.10
August	17	3.60	4.55	2.50	2.25
September .	17	3.60	4.25	2.41	2.50
October ...	17	3.60	4.25	2.23	2.50
November .	17	3.60	4.00	2.15	2.50
December ..	17	3.60	3.60	2.03	....

*Selling by discount discontinued in August, 1919.

Hoop and Band Prices

Cents per pound, base Pittsburgh

	1918	1919	1920	1921	1922
January ...	*3.50	3.30	3.05	3.05	†1.97
February ..	3.50	3.30	3.65	2.99	1.85
March	3.50	3.24	4.88	2.72	1.83
April	3.50	3.05	3.83	2.73	1.93
May	3.50	3.05	3.05	2.75	2.05
June	3.50	3.05	3.05	2.69	2.37
July	3.50	3.05	3.05	2.48	2.48
August	3.50	3.05	3.05	2.40	2.55
September .	3.50	3.05	3.05	2.28	2.75
October ...	3.50	3.05	3.05	2.25	2.90
November .	3.50	3.05	3.05	2.21	2.90
December ..	17	3.60	3.60	2.03	2.50

*Bands were 2.90c, Pittsburgh, January to May, 1918.

†Hoops were $2 to $4 above bands, January to April, 1922.

Bar Iron Prices, Cents

Cents per pound, Chicago mill

	1918	1919	1920	1921	1922
January ...	3.50	3.13	3.13	2.76	1.61
February ..	3.50	2.95	3.44	2 66	1.60
March	3.50	2.86	3.50	2.63	1.58
April	3.50	2.58	3.75	2.48	1.63
May	3.50	2.50	3.75	2.45	1.67
June	3.50	2.53	3.75	2.22	1.74
July	3.50	2.62	3.75	1.96	1.80
August	3.50	2.62	3.75	1.75	1.98
September .	3.50	2.62	3.75	1.75	2.25
October	3.50	2.68	3.75	1.75	2.50
November .	3.50	2.73	3.75	1.70	2.50
December ..	3.50	2.77	3.50	1.65	2.35

Average Steel Bar Prices by Months, 1907-1922

Cents per pound, base, Pittsburgh

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
January	1.60	1.60	1.40	1.49	1.40	1.15	1.40	1.20	1.10	1.86	2.95	2.90	2.70	3.10	2.35	1.50
February	1.60	1.60	1.30	1.45	1.40	1.13	1.41	1.22	1.10	2.01	3.00	2.90	2.70	3.85	2.14	1.40
March	1.60	1.60	1.20	1.45	1.40	1.11	1.40	1.22	1.15	2.34	3.20	2.90	2.60	3.85	2.00	1.45
April	1.60	1.60	1.15	1.45	1.40	1.17	1.40	1.17	1.20	2.50	3.40	2.90	2.35	3.65	2.07	1.50
May	1.60	1.60	1.20	1.45	1.40	1.20	1.40	1.17	1.20	2.50	3.50	2.90	2.35	3.25	2.10	1.60
June	1.60	1.50	1.20	1.45	1.25	1.21	1.40	1.13	1.20	2.50	3.65	2.90	2.35	3.25	2.06	1.65
July	1.60	1.40	1.25	1.45	1.24	1.25	1.40	1.12	1.26	2.50	3.90	2.90	2.35	3.25	1.86	1.70
August	1.60	1.40	1.35	1.40	1.20	1.25	1.40	1.17	1.30	2.50	4.00	2.90	2.35	3.25	1.75	1.80
September	1.60	1.40	1.40	1.40	1.17	1.34	1.40	1.19	1.34	2.60	3.75	2.90	2.35	3.25	1.66	2.00
October	1.60	1.40	1.40	1.40	1.11	1.40	1.40	1.18	1.41	2.60	2.90	2.90	2.35	3.25	1.60	2.00
November	1.60	1.40	1.45	1.40	1.08	1.40	1.34	1.19	1.65	2.78	2.90	2.90	2.45	3.00	1.50	2.00
December	1.60	1.40	1.50	1.40	1.12	1.40	1.22	1.07	1.74	2.90	2.90	2.90	2.40	2.65	1.50	2.00

latter most of the year. The United States Steel Corp. as a general thing was on a basis of about $2 under independents.

Cold-finished bars pursued a similar course, production being hindered by lack of raw material much of the time, deliveries late in the year being three months behind. It was impossible to bring production anywhere near capacity. Hoops and bands were in demand after the first quarter and makers were unable to sell freely on account of uncertainty of deliveries.

Bar iron had a hard year, cost of production keeping the price above soft steel at all times. Users turned to steel to an extent that limited demand for iron. Mills were idle at times and production was low in the aggregate.

Rail steel bars were not in demand until May, when mills began to feel a buying movement. Selling was moderate through the year and irregular conditions existed most of the time. Some mills which had been idle for months resumed activity and ran steadily the latter part of the year. The quotation was 1.50c, mill, at the beginning of the year, 1.60c, mill, in June, 1.85c, mill, in August and 2.00c, mill, from September to December.

Rail Steel Bars

Cents per pound, Chicago

	1918	1919	1920	1921	1922
January ...	3.00	2.80	2.91	2.50	1.58
February ..	3.00	2.80	3.18	2.50	1.50
March	3.00	2.80	3.37	2.50	1.50
April	3.00	2.54	3.70	2.13	1.56
May	3.00	2.45	3.75	2.00	1.65
June	3.00	2.45	3.75	2.00	1.65
July	3.00	2.45	3.75	1.93	1.70
August	3.00	2.55	3.75	1.85	1.80
September .	3.00	2.55	3.75	1.85	1.93
October ...	3.00	2.55	3.75	1.75	2.00
November .	3.00	2.75	3.75	1.70	2.00
December ..	3.00	2.85	2.75	1.65	2.00

Welded Pipe Conditions Are Promising

FLUCTUATIONS both in demand and prices largely have been absent from the welded steel pipe market during the past year. While during the first half some price cutting was done, the Dec. 15, 1921, cards represented the official levels until Aug. 17, 1922. Independent producers then, led by the Youngstown Sheet & Tube Co., put out new cards, advancing black pipe $6 and galvanized $4 per ton. The new discounts subsequently were met by the National Tube Co. On Oct 19. the leading interest again assumed the initiative and advanced $4 per ton, ⅛-inch pipe being the only size increased $5. Independents immediately followed.

The sustained demand for pipe was due largely to widespread building programs. Reserve stocks of pipe in the hands of makers dwindled, it having been impossible to keep up with consumption in the period of curtailed bessemer plant operation which ensued following the calling of the coal strike April 1. The inauguration of the rail strike July 1 served further to withhold much pipe from usual distributing channels and jobbers to date have been unable adequately to replenish their badly depleted stocks.

At the commencement of the year, the National Tube Co. as well as independents maintained an average operating schedule of 70 per cent. This was increased to 80 per cent by the end of March, although by June 30 it had slipped back. Lost ground was regained in the third quarter and by the end of the year the general average for all makers was between 80 and 90 per cent with certain plants at 100 per cent.

One outstanding feature of the market was the heavy pipe line business, particularly in the oil fields. The largest order was booked in September by the National Tube Co. It involved 113,000 tons of 8, 10 and 12-inch pipe and was valued at approximately $6,000,000.

On Oct. 1, pipe mills commenced to apply to preferential and cash discounts to prices f.o.b. Pittsburgh instead of the delivered price. They reduced the regular discount with the extra discounts of 5 and 2½ per cent to a simple net discount and then deducted the freight, bringing about a slightly increased revenue on pipe sales at distant points from Pittsburgh.

Some pipe makers are well committed over and beyond the first quarter of 1923 and the outlook is particularly bright for this year. One maker has allocated its monthly output for six months to come to regular customers. Jobbers lately have been pressing for deliveries.

Changes in Discounts on Steel Pipe

Date	Sizes in inches	—Butt Weld— Basing Black	Discount Galv.
Jan. 1, 1910 to Oct. 1, 1910	⅜ to 6	78	68
Oct. 1, 1910 to Oct. 2, 1911	2 to 3	80	70
Oct. 2, 1911 to Dec. 1, 1911	2 to 3	81	74
Dec. 1, 1911 to Dec. 15, 1911	2 to 3	83	76
Dec. 15, 1911 to Jan. 1, 1912	2 to 3	83	76
Jan. 1, 1912 to July 1, 1912	2 to 3	82	75
July 1, 1912 to July 24, 1912	2 to 3	82	75
July 24, 1912 to Sept. 10, 1912	2 to 3	81	74
Sept. 10, 1912 to Jan. 1, 1913	2 to 3	80	72
Jan. 1, 1913 to Apr. 12, 1913	⅜ to 3	80	71½
Apr. 12, 1913 to May 27, 1913	⅜ to 3	79½	71
May 27, 1913 to Aug. 8, 1913	⅜ to 3	79	70½
Aug. 8, 1913 to Oct. 27, 1913	⅜ to 3	80	71½
Oct. 27, 1913 to Feb. 2, 1914	⅜ to 3	80	71½
Feb. 2, 1914 to Apr. 20, 1914	⅜ to 3	79½	71
Apr. 20, 1914 to Nov. 2, 1914	⅜ to 3	80	71½
Nov. 2, 1914 to Feb. 11, 1915	⅜ to 3	82	72½
Feb. 11, 1915 to May 1, 1915	⅜ to 3	80	69½
May 1, 1915 to June 1, 1915	⅜ to 3	79	68½
June 1, 1915 to June 17, 1915	⅜ to 3	79	63½
June 17, 1915 to Aug. 15, 1915	⅜ to 3	79	57½
Aug. 15, 1915 to Nov. 1, 1915	⅜ to 3	79	63½
Nov. 1, 1915 to Jan. 4, 1916	⅜ to 3	78	63½
Jan. 4, 1916 to Jan. 20, 1916	⅜ to 3	77	62½
Jan. 20, 1916 to Feb. 15, 1916	⅜ to 3	76	60½
Feb. 15, 1916 to Feb. 29, 1916	⅜ to 3	75	59½
Feb. 29, 1916 to Mar. 15, 1916	⅜ to 3	74	57½
Mar. 15, 1916 to Mar. 29, 1916	⅜ to 3	73	55½
Mar. 29, 1916 to Apr. 21, 1916	⅜ to 3	72	53½
Apr. 21, 1916 to July 24, 1916	⅜ to 3	70	50½
July 24, 1916 to Sept. 7, 1916	⅜ to 3	70	55½
Sept. 7, 1916 to Nov. 1, 1916	⅜ to 3	69	55½
Nov. 1, 1916 to Nov. 15, 1916	⅜ to 3	69	55½
Nov. 15, 1916 to Dec. 4, 1916	⅜ to 3	68	54½
Dec. 4, 1916 to Dec. 30, 1916	⅜ to 3	66	52½
Dec. 30, 1916 to Feb. 14, 1917	⅜ to 3	64	56½
Feb. 14, 1917 to Mar. 5, 1917	⅜ to 3	62	48½
Mar. 5, 1917 to Apr. 2, 1917	⅜ to 3	60	46½
Apr. 2, 1917 to Nov. 6, 1917	⅜ to 3	55	41½
Nov. 6, 1917 to Jan. 1, 1919	⅜ to 3	51	37½
Jan. 1, 1919 to Mar. 21, 1919	⅜ to 3	54	40½
*Mar. 21, 1919 to Apr. 13, 1921	⅜ to 3	57½	44
Apr. 13, 1921 to July 7, 1921	1 to 3	62½	50
July 7, 1921 to Sept. 16, 1921	1 to 3	64½	52
Sept. 16, 1921 to Dec. 15, 1921	1 to 3	68½	56
Dec. 15, 1921 to Aug. 17, 1922	1 to 3	71	58½
Aug. 17, 1922 to Oct. 19, 1922	1 to 3	68	56½
Oct. 19, 1922 to date	1 to 3	66	54½

* Level adopted by independent companies Dec. 31, 1920.

High Tariff Features 1922 Ferro

Application of New Duty Adds $33.60 Per Ton to Tidewater Price—Effect of Import Tax on Manganese Ore Expected To Be Gain in Output of Manganiferous Pig Iron—See Ferro Shortage by July 1

BY FAR the most important development in the ferromanganese market in 1922 was the application, effective Sept. 21, of a duty of 1⅞ cents per pound on the manganese contained. This figures out to $33.60 per gross ton, the highest duty ever applicable to ferromanganese.

At the same time, there went into effect a duty of one cent per pound on the metallic manganese contained in manganese ore imports, making manganese ore dutiable for the first time. The duty was intended to protect domestic manganese ore and some activity now is under way preparatory to producing manganese ore in the Batesville, Ark., district and in Virginia. Owing to the fact that all consumers are protecting themselves on manganese ore sometime ahead, the domestic producers have not had an opportunity to market any tonnage.

Well informed authorities believe that under normal circumstances only a small portion of the ferromanganese consumed in this country could be produced from domestic ore. While it still is regarded as too early to make any definite statement in this direction, it is thought the chief effect on domestic ore production from the imposition of the duties on ferromanganese and manganese ore will be to encourage the consumption of domestic manganiferous ore. This would mean an increased production of manganiferous pig iron and spiegeleisen in order that the consumption of ferromanganese may be reduced.

The $33.60 tariff does not represent the protection to domestic producers of this metal. On an average, 2.2 tons of manganese ore are required to make a ton of 80 per cent ferromanganese. As ferromanganese now is being produced entirely from foreign ore, this means a duty of $24.64 on the ore for every ton of ferromanganese. The net advantage enjoyed by the domestic ferromanganese producer figures out to $8.96 per ton and American producers in claiming that they need protection state that on market conditions which prevailed in December English makers had a lower coke cost of $9.45

50 PER CENT MANGANESE ORE
Per long ton, c.i.f. Atlantic port

	1918	1919	1920	1921	1922
Jan.	$63.75	$55.50	$30.00	$18.75	$10.50
Feb.	63.75	38.75	30.75	17.50	11.00
Mar.	60.00	37.50	38.75	17.25	12.50
April	65.00	30.00	32.25	14.00	12.75
May	65.00	30.00	35.00	14.00	12.75
June	65.00	30.00	37.50	12.50	13.25
July	68.50	31.25	42.25	12.50	13.50
Aug.	65.00	31.25	35.00	12.50	13.75
Sept.	65.00	30.00	35.00	12.50	14.37
Oct.	65.00	27.50	32.75	12.50	25.50
Nov.	62.50	27.50	25.00	12.50	25.50
Dec.	55.00	27.50	21.25	12.00	25.50

FERROMANGANESE
Delivered Pittsburgh

	1922	1921	1920	1919	1918
Jan.	$ 61.90	$101.00	$146.00	$212.50*	$250.00
Feb.	65.32	96.85	160.00	165.00	250.00
Mar.	67.82	89.00	172.00	134.00	250.00
April	69.07	87.50	200.00	113.75	250.00
May	72.32	83.00	200.00	110.00	250.00*
June	72.82	76.50	198.00	111.75	250.00*
July	72.29	75.00	190.00	111.00	250.00*
Aug.	72.29	70.75	193.75	110.00	250.00*
Sept.	80.59†	64.75	172.40	105.00	250.00*
Oct.	105.47	61.65	156.40	110.00	250.00*
Nov.	104.91	60.00	153.00	110.00	250.00*
Dec.	104.91	60.00	120.00	121.00	236.00*

*Prices from May, 1918, to January, 1919, inclusive, were based on 70 per cent ferromanganese. All other prices in above table were based on 80 per cent metal.

†Duty of 1⅞ cents per pound contained manganese became effective on ferromanganese Sept. 21.

SPIEGELEISEN
At Producers' Furnaces

	1922	1921	1920	1919	1918	1917
Jan.	$25.50	$46.25	$46.60	$67.50*	$59.00	$57.50
Feb.	28.00	37.75	57.60	52.50*	59.00	66.25
Mar.	28.00	34.20	60.40	42.50*	65.50	77.50
April	30.00	32.00	66.85	34.50*	70.00*	76.75
May	35.00	31.75	75.00	31.35*	71.00*	78.00
June	35.25	29.60	75.00	27.50*	75.00*	83.00
July	35.00	27.50	75.00	34.00	75.00*	85.00
Aug.	37.00	26.20	79.35	34.00	75.00*	81.25
Sept.	38.00	25.25	82.00	34.00	75.00*	80.50
Oct.	37.75	24.85	80.00	34.00	75.00*	73.50
Nov.	36.80	25.00	74.35	34.00	75.00*	63.25
Dec.	35.75	25.00	57.90	39.00	72.50*	60.00

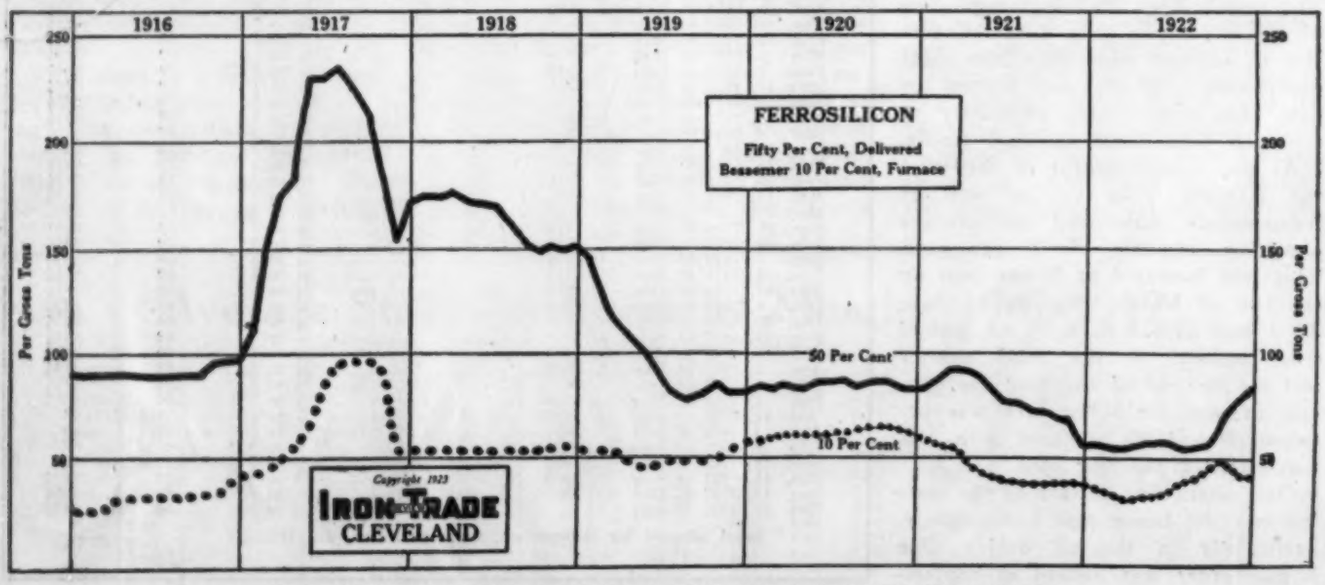
*Prices from and including April, 1918, and to and including June, 1919, are for 16 per cent spiegeleisen. All other prices apply to 20 per cent metal.

50 PER CENT FERROSILICON
Per ton, freight allowed

	1918	1919	1920	1921	1922
Jan.	$175.00	$145.00	$82.00	$80.00	$57.50
Feb.	175.00	125.00	80.00	92.00	55.00
March	177.50	115.00	83.00	93.00	54.00
April	172.50	110.00	80.00	90.00	55.00
May	170.00	100.00	83.00	80.00	57.00
June	170.00	85.00	82.50	75.00	57.50
July	165.00	80.00	82.50	75.00	55.00
Aug.	153.50	78.00	80.00	65.00	55.00
Sept.	150.00	80.00	82.50	65.00	55.00
Oct.	151.00	85.00	82.50	60.00	70.00
Nov.	150.00	80.00	80.00	60.00	82.50
Dec.	150.00	80.00	80.00	57.00	82.50

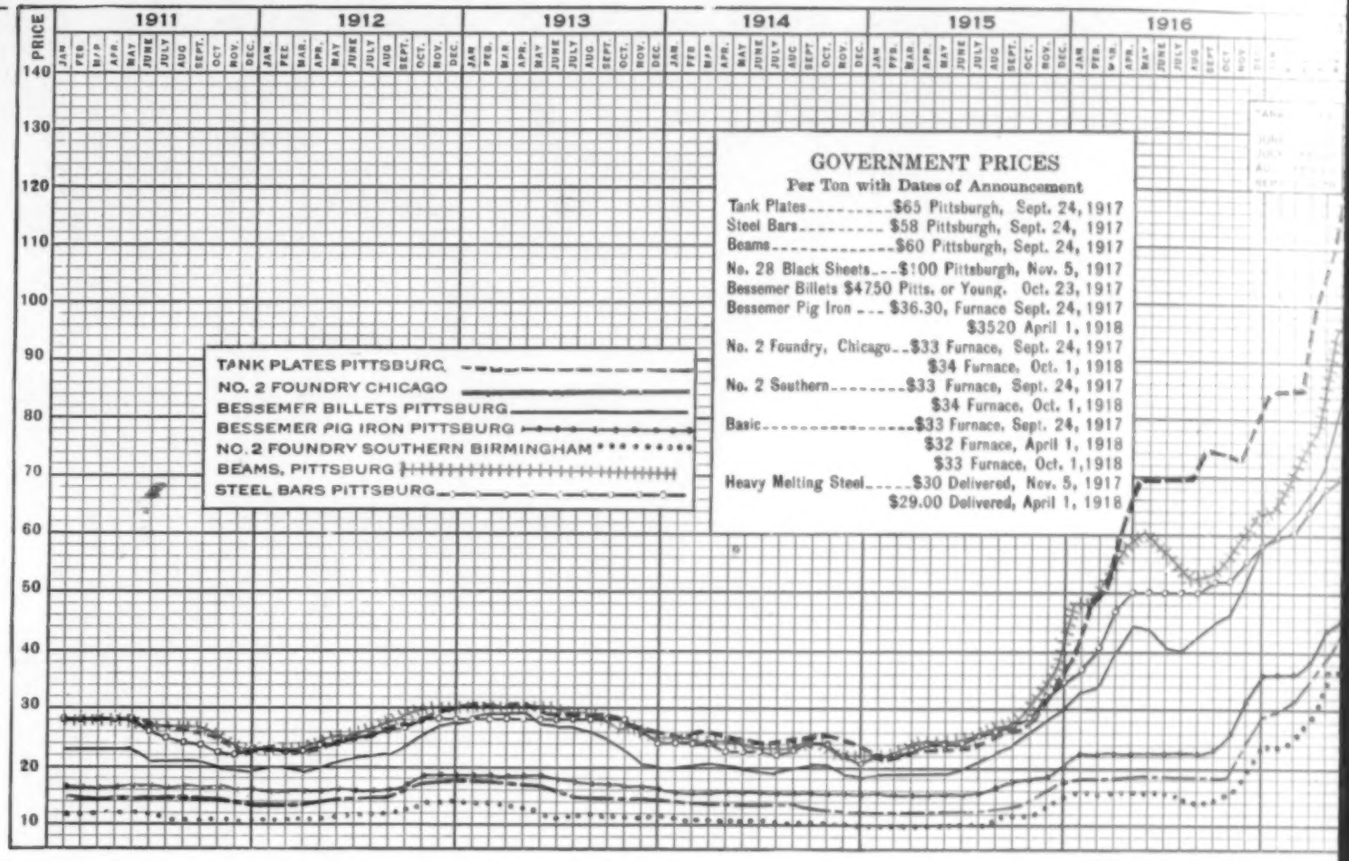
FERROTUNGSTEN
Per pound of metallic tungsten contained

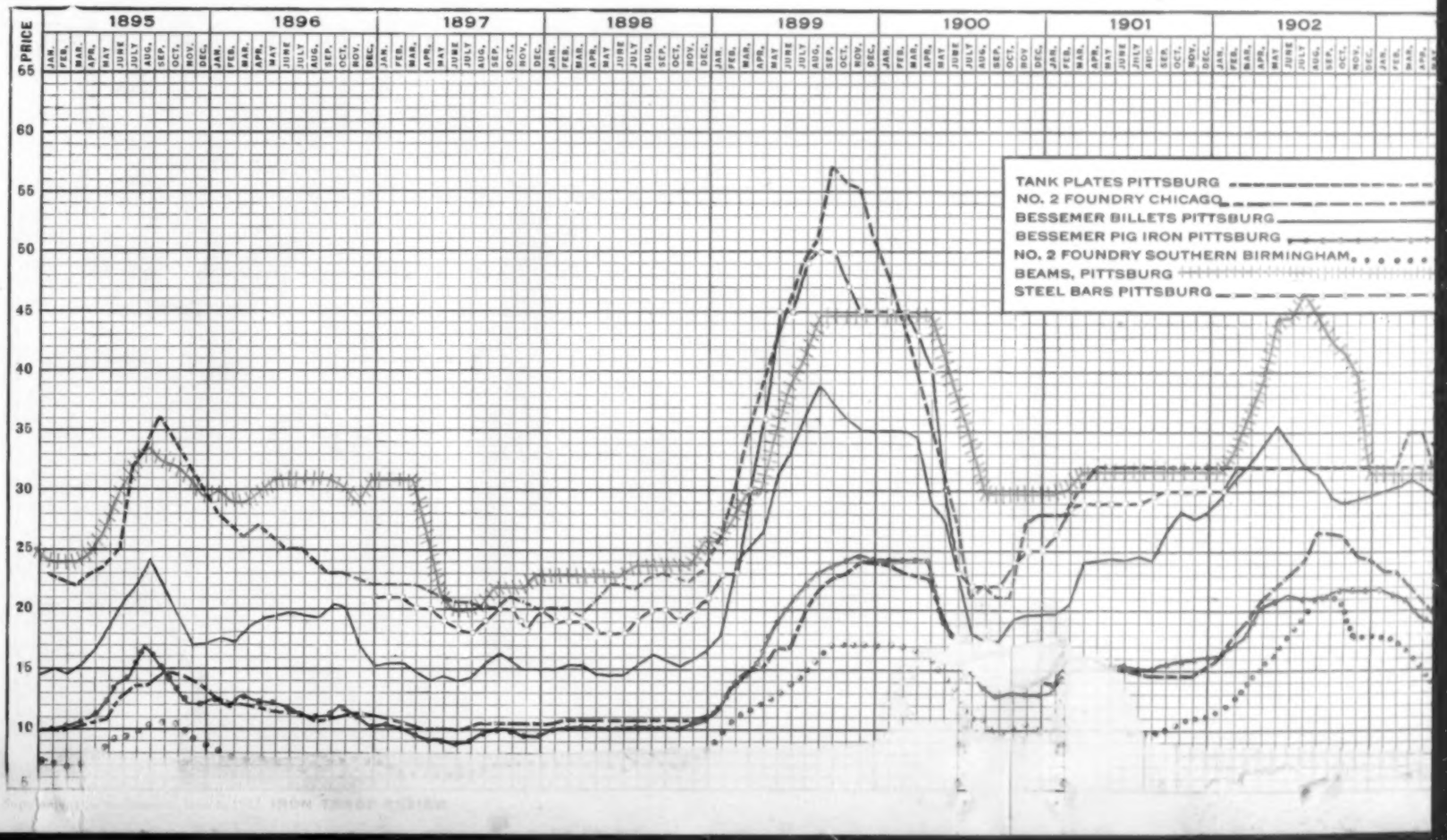
	1918	1919	1920	1921	1922
January	$1.95	$2.35	$1.05	$0.65	$0.42
February	2.72	2.15	1.05	0.57	0.37
March	1.98	2.07	1.00	0.57	0.42
April	2.32	1.75	1.00	0.47	0.42
May	2.26	1.40	1.05	0.47	0.42
June	2.23	1.32	1.07	0.50	0.42
July	2.25	1.30	1.12	0.50	0.42
August	2.32	1.22	1.10	0.47	0.42
September	2.32	1.25	1.10	0.36	0.42
October	2.55	1.25	0.95	0.36	0.85
November	2.65	1.20	0.95	0.36	0.92
December	2.45	1.15	0.95	0.36	0.92



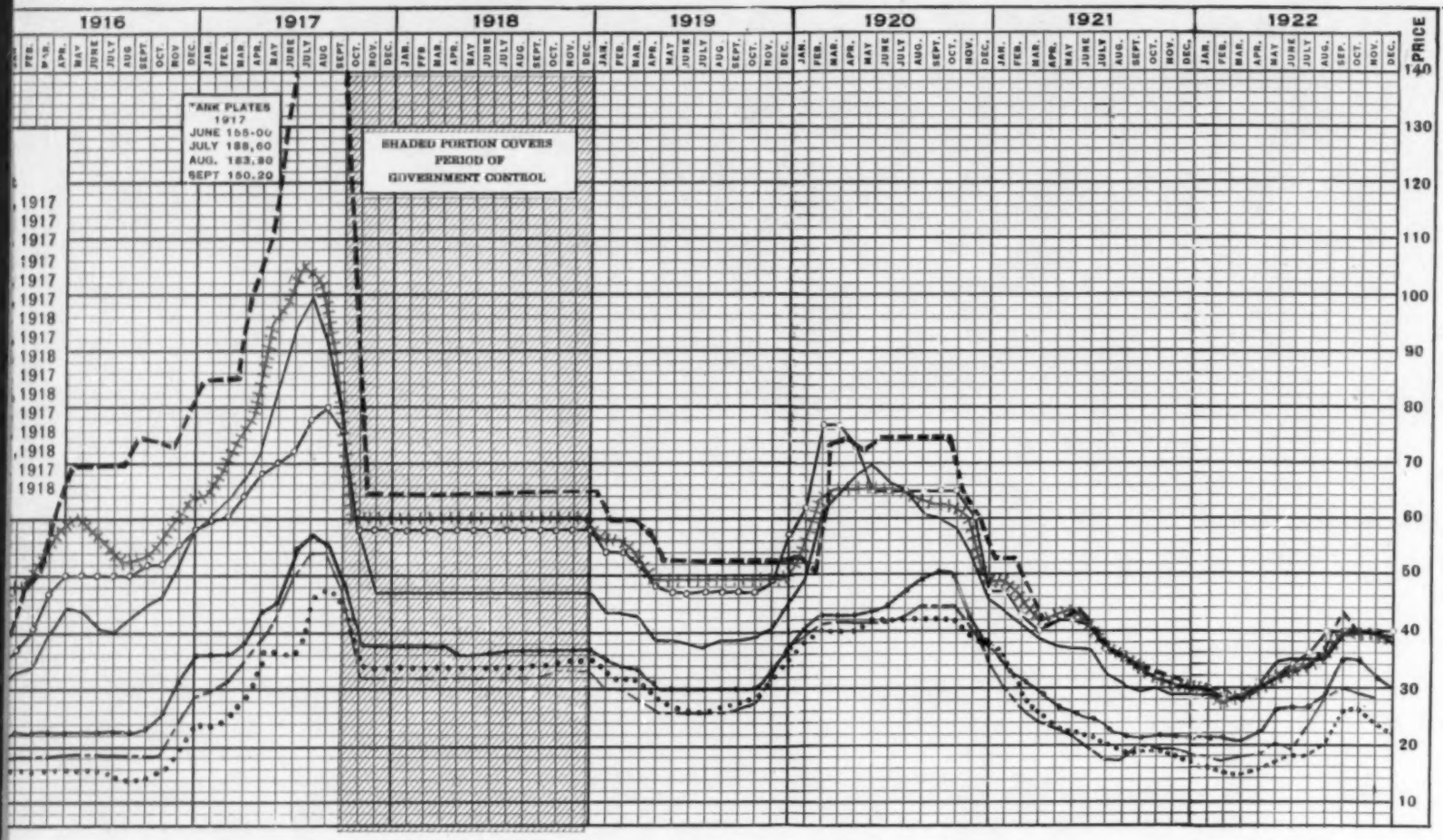
THE TRENDS OF FERROSILICON PRICES ARE SHOWN IN THIS CHART

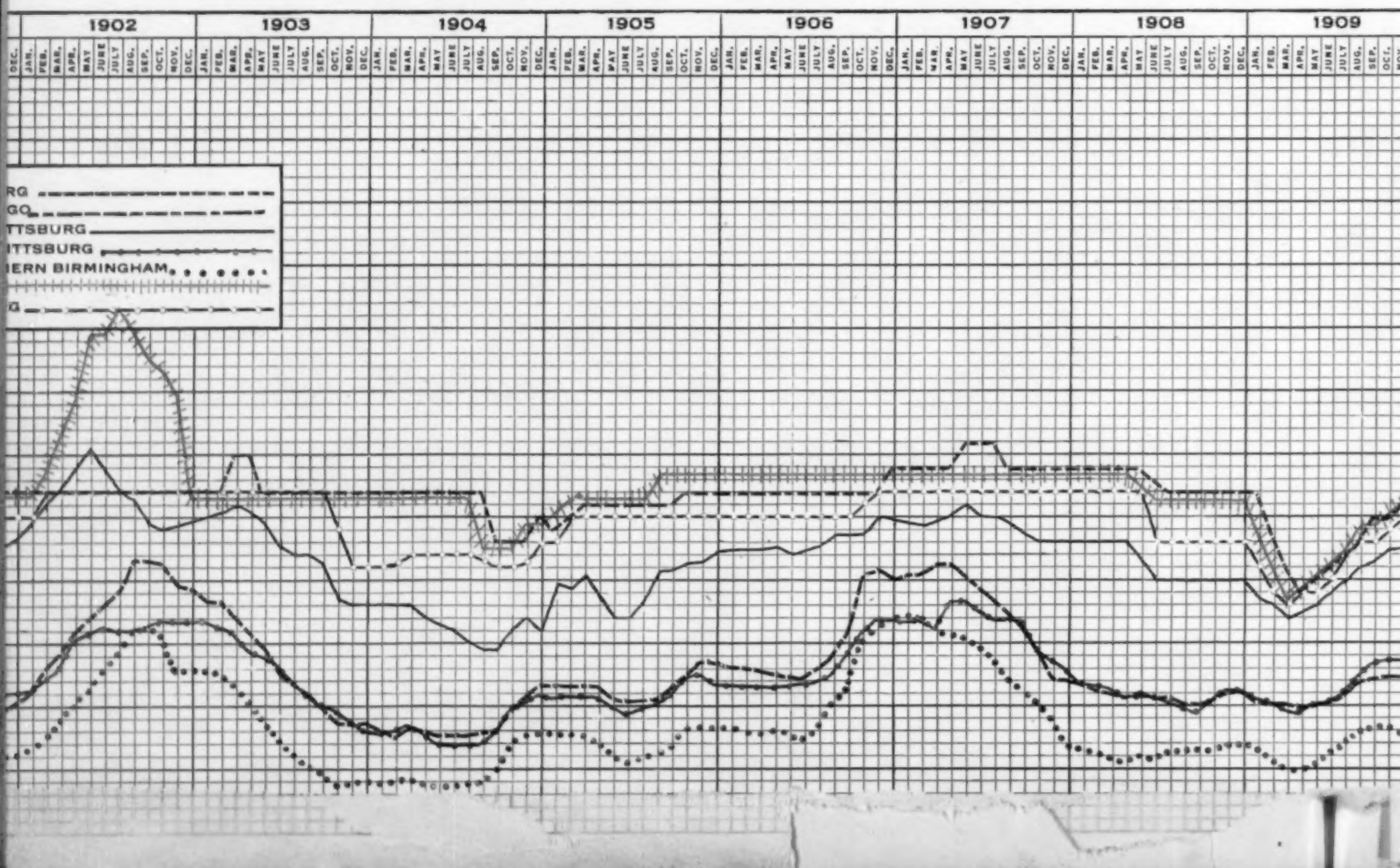
Finished Steel Products Given In Net Tons, Pig Iron and Billets In Gross Tons

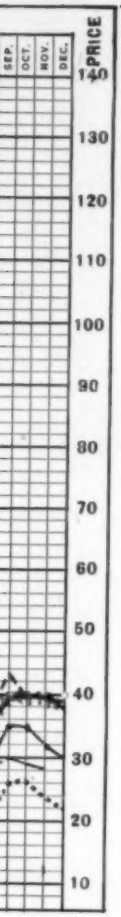

PRICE
1911
1912
1913
1914
1915
1916
TANK PLATES PITTSBURG
NO. 2 FOUNDRY CHICAGO
BESSEMER BILLETS PITTSBURG
BESSEMER PIG IRON PITTSBURG
NO. 2 FOUNDRY SOUTHERN BIRMINGHAM
BEAMS, PITTSBURG
STEEL BARS PITTSBURG
GOVERNMENT PRICES
Per Ton with Dates of Announcement
Tank Plates.....$65 Pittsburgh, Sept. 24, 1917
Steel Bars.....$58 Pittsburgh, Sept. 24, 1917
Beams.....$60 Pittsburgh, Sept. 24, 1917
No. 28 Black Sheets...$100 Pittsburgh, Nov. 5, 1917
Bessemer Billets $4750 Pitts. or Young. Oct. 23, 1917
Bessemer Pig Iron ... $36.30, Furnace Sept. 24, 1917
$3520 April 1, 1918
No. 2 Foundry, Chicago...$33 Furnace, Sept. 24, 1917
$34 Furnace, Oct. 1, 1918
No. 2 Southern.....$33 Furnace, Sept. 24, 1917
$34 Furnace, Oct. 1, 1918
Basic.....$33 Furnace, Sept. 24, 1917
$32 Furnace, April 1, 1918
$33 Furnace, Oct. 1,1918
Heavy Melting Steel.....$30 Delivered, Nov. 5, 1917
$29.00 Delivered, April 1, 1918



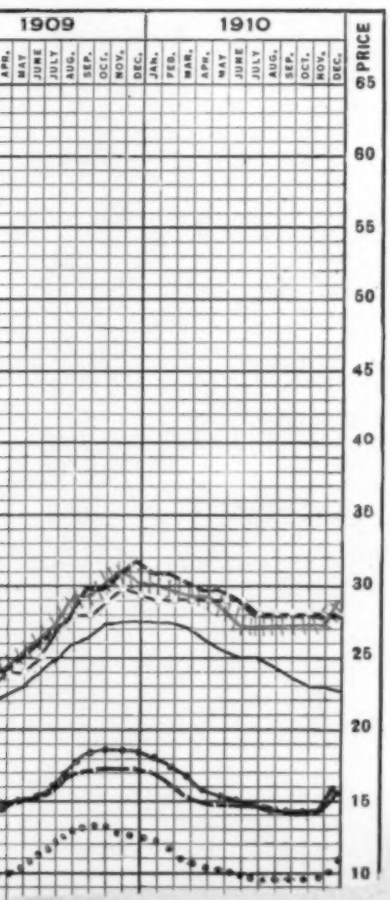
ON TRADE REVIEW







Monthly Fluctuations of Iron and Steel Prices For a Period of Twenty-Eight Years



per ton of ferromanganese produced.

The year started with a visible surplus of ferromanganese in the hands of American merchants and consumers estimated at 30,000 tons and with merchant stocks in England of about 8000 tons. By midyear, these reserves had disappeared.

Demand then received a great stimulus, due not only to increased consumption, but also to a desire to anticipate the tariff. Ore purchases were encouraged by the same factors responsible for the increased business in ferromanganese. As a result consumers are provided with ore commitments sufficient for at least the first quarter of 1923 and in some cases first half. Most of the ore stocks now on hand are held by steel companies which produce ferromanganese for their own consumption. The total ores now on hand for the manufacture of merchant ferromanganese available for 1923 delivery probably is equivalent to 30,000 to 40,000 tons of ferromanganese. Some authorities, after analyzing all factors, believe that a shortage of ferromanganese will manifest itself before July 1.

Spiegeleisen production was resumed in January last year following a cessation of production during the latter part of 1921. At the beginning of 1922, large stocks of spiegeleisen were on hand. At the beginning of the year, the market on 20 per cent spiegeleisen was $24 to $26 furnace. The price went up steadily until August when small quantities were sold at $39. At the close of the year, spiegeleisen was selling at around $35. Moderate ton-

During the first three quarters of 1922 the special ferroalloys, including ferrosilicon, ferrotungsten, ferrochrome, ferrovanadium, and ferromolybdenum gradually were emerging from a condition of severe depression. This period, however, was marked by the influence of import offerings of all of these alloys except vanadium, which has been subject to specific conditions. Toward the end of the third quarter, when it became established that the 1922 tariff bill would be enacted, providing substantial specific duties on all the alloys excepting vanadium, the markets began to advance.

FERROVANADIUM

Per pound of metallic vanadium contained

	1920	1921	1922
Jan.	$6.00 to 7.00	$6.50 to 7.00	$4.25 to 4.75
Feb.	6.00 to 7.00	5.00 to 7.00	3.75 to 4.00
March	6.25 to 7.00	5.00 to 6.50	3.75 to 4.00
April	6.25 to 7.00	5.00 to 6.75	3.75 to 4.00
May	6.25 to 8.00	5.00 to 6.50	3.75 to 4.00
June	6.50 to 8.00	5.00 to 6.00	3.75 to 4.00
July	6.50 to 8.00	5.00 to 6.00	3.50 to 4.00
Aug.	6.50 to 9.50	5.00 to 5.50	3.50 to 4.00
Sept.	6.50 to 9.00	4.50 to 5.00	3.50 to 4.00
Oct.	6.50 to 8.50	4.50 to 5.00	3.50 to 4.00
Nov.	6.50 to 8.25	4.25 to 4.75	3.50 to 4.00
Dec.	6.50 to 7.25	4.25 to 4.75	3.50 to 4.00

TUNGSTEN ORE

Per short ton unit, f.o.b. New York

	1918	1919	1920	1921	1922
Jan.	$17.00	$26.00	$22.00	$6.50	$3.50
Feb.	17.00	24.00	15.50	6.50	3.25
March	17.00	24.00	12.50	6.25	3.00
April	18.00	25.00	9.50	6.00	3.00
May	20.00	25.00	8.50	7.00	2.75
June	20.00	25.00	8.50	7.00	2.50
July	22.00	24.00	8.50	6.75	2.75
Aug.	25.00	25.00	8.50	6.50	3.00
Sept.	25.00	25.00	7.75	6.50	2.75
Oct.	26.00	25.00	8.50	5.50	7.00
Nov.	26.00	25.00	8.25	4.25	7.50
Dec.	26.00	25.00	8.00	4.25	7.50

Imports and Domestic Production of Manganese Alloys—Imports of Manganese Ore

In Gross Tons

	Production		Imports		
	Ferro-manganese	Spiegel-eisen	Ferro-manganese	Spiegel-eisen	Imports Manganese ore
1922*	145,000	63,500	100,000	.....	435,000
1921	100,694	55,042	9,057	.....	401,000
1920	286,365	110,685	59,254	.....	601,437
1919	175,009	84,014	33,022	.....	333,344
1918	325,133	303,535	27,168	.....	491,303
1917	328,000	187,000	51,800	.....	663,500
1916	275,204	187,233	90,928	.....	576,321
1915	144,260	114,556	55,263	200	313,985
1914	100,731	76,625	82,997	2,870	283,294
1913	119,495	106,980	128,070	77	345,090
1912	125,378	102,561	99,137	1,015	300,661
1911	74,602	104,013	80,263	20,970	176,852
1910	71,376	153,055	114,228	25,383	242,348
1909	82,209	142,831	88,934	16,921	212,765
1908	40,642	111,376	44,624	4,579	178,203
1907	55,918	283,430	87,400	48,994	209,021
1906	55,520	244,980	84,359	103,268	221,260
1905	62,186	227,797	52,841	55,457	257,033

*Estimated.

FERROCHROME, 4 TO 6 PER CENT CARBON

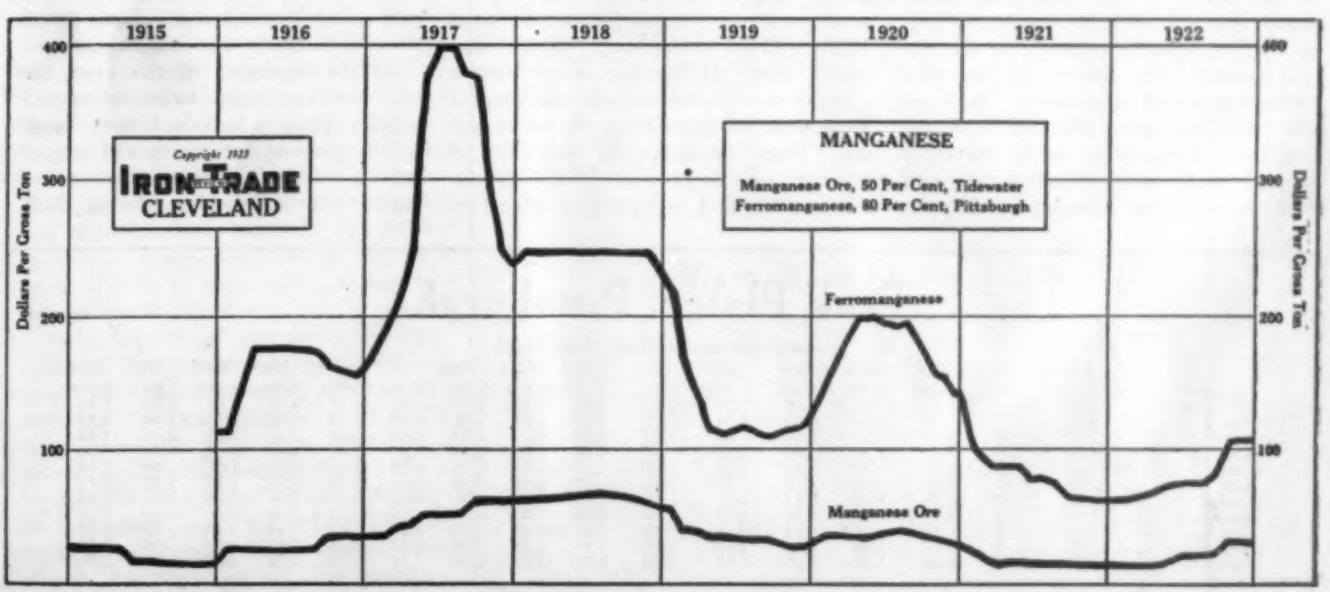
Per pound of metallic chromium contained

	1918	1919	1920	1921	1922
Jan.	....	$41.00	$22.50	$17.50	$14.50
Feb.	....	32.50	19.50	17.25	12.00
March	....	31.00	19.50	17.25	12.00
April	....	31.00	19.50	16.25	12.00
May	....	32.00	18.50	16.00	12.00
June	....	32.00	18.50	15.00	12.00
July	$44.00	32.00	21.50	15.00	12.00
Aug.	41.00	32.00	20.00	14.00	12.00
Sept.	41.00	29.00	18.50	14.50	12.00
Oct.	41.00	29.00	18.50	14.50	13.00
Nov.	41.00	28.00	18.50	14.50	13.50
Dec.	41.00	28.00	18.50	14.50	13.50

NEW CALEDONIAN CHROME ORE 48-50 PER CENT

Per long ton, c.i.f. Atlantic port

	1918	1919	1920	1921	1922
Jan.	$81.75	$57.50	$47.50	$26.75	$21.75
Feb.	81.75	60.00	47.50	25.00	21.75
March	81.75	50.00	45.00	25.00	22.50
April	87.50	55.00	45.00	20.00	19.00
May	90.00	57.50	40.00	22.50	20.00
June	90.00	45.00	40.00	21.75	20.00
July	90.00	45.00	40.00	21.75	24.50
Aug.	100.00	45.00	40.00	21.75	25.00
Sept.	92.50	45.00	40.00	21.75	30.00
Oct.	87.50	50.00	38.75	22.50	30.00
Nov.	87.50	47.50	37.50	21.75	30.00
Dec.	87.50	47.50	37.50	21.75	30.00



HOW FERROMANGANESE AND MANGANESE ORE PRICES HAVE PROGRESSED IS SHOWN HERE

Plate Production Restricted

Fuel and Labor Shortages Curtail Year's Output—Railroads Were Largest Consumers and a Heavy Demand Came from Oil Industry—Makers Fear Excess of Capacity—Tendency Toward Specification Material

A YEAR ago platemakers viewed with concern the fact a large percentage of the country's plate capacity was unoccupied. It was feared the wartime expansion had built up capacity in excess of normal requirements. Since then events have tended to dissipate these fears to some extent, although some well-informed platemakers still maintain that under normal conditions there would not be enough demand to absorb all of the platemaking capacity. However, as a result of the ever increasing volume of demand, most plate mills during the second half of 1922 had all the business they could handle and some of them were forced to turn away large tonnages during the last quarter. At the close of the year, the leading interest had enough unfilled tonnage on its order book to take up all of its output until July 1, 1923.

It was only the eastern section of the country which reflected less satisfactory conditions. Demand in that section did not keep pace with the requirements of the Middle West. When steelmaking plants in other districts were crippled by lack of fuel the eastern mills had all the work they could handle. When operating schedules in the West and Middle West later improved, production in the East fell off, and at the end of the year the eastern plate mills were not producing in excess of 50 per cent.

At no time during the year, apparently, did the plate production reach 80 per cent. In the first quarter, demand was not of sufficient proportions to support capacity output. In the second quarter the effects of the coal strike manifested themselves. Mills encountered increasing difficulty in obtaining coal. In a great many instances, oil and other fuels, including tar, were used in operating open-hearth furnaces. Shortage of fuel continued to hamper steel production after the coal strike was settled, and at the close of the year it was impossible to produce steel at anything like capacity, because lack of fuel prevented the full operation of blast furnaces.

In addition to the shortage of fuel, the shortage of labor also to some extent was a restrictive factor. In endeavoring to judge the relation between platemaking capacity and plate consuming requirements, on the basis of the 1922 performance, these handicaps to production must be considered. Had the plate mills been able to operate at 100 per cent there would have been considerable surplus capacity.

There is an opinion among steelmakers that the railroads bought at a much heavier rate during 1922 than can be regarded as average annual commitments. Railroad buying in 1922 not only included the normal requirements of the year, but also a large amount of equipment which should have been bought in previous years. Railroad demands included not only huge tonnages for new construction but also large quantities of repair plates. New freight car buying by domestic roads in 1922 exceeded the 1921 volume by more than 500 per cent. It was expected in December that when all the returns came in, the total freight car buying in 1922 would be found to equal or surpass that of 1916. Up to Dec. 1, a total of 157,173 cars had been placed, and it was estimated on Dec. 15, the total would be swelled by an additional 12,500. The outstanding month was April, when 31,500 cars were placed.

Next to railroad buying, the biggest plate demand came from the oil industry. Huge quantities of skelp for oil country pipe lines were rolled by the plate mills and tremendous quantities of plates were used in the construction of oil storage tanks.

A potentially large consumer of plates which again stayed out of the market in 1922 was the shipbuilding industry. Plate demand for shipbuilding again was far below normal. A large percentage of such plates as were used was from government salvage.

Roughly, the plate market opened around 1.45c to 1.50c, base Pittsburgh, in January. In February the market sagged to 1.30c and some tonnages were placed below this figure. Early in March, a firmer tendency was shown and prices ascended until the high level of the year, 2.25c to 2.50c, base Pittsburgh, was reached in September. The market then eased off to 1.90c in December, although in some instances business was taken below this figure.

The average price of tank plates at Pittsburgh in 1922 was estimated on Dec. 15 as 1.729c. This was only 15.4 per cent higher than the 10-year average of 1.498c over the period 1904-1913.

While the greater portion of the demand in 1922 involved ordinary tank plates there is developing a greater tendency toward specification material. Too, in view of the increased use of alloy steels for various purposes, it was only logical that there should be some interest in alloy plates in 1922. Considerable interest was manifested in some directions with respect to the use of nickel steel plates for high pressure boilers it being thought that thinner plates could be used. Plate makers report more demand for copper bearing steel, particularly for freight cars.

At the beginning of the year, there still were on hand large tonnages of salvage plate which had been bought by the government during and after the war. Practically all of these stocks passed into consumption during 1922.

Tank Plates, Pittsburgh

Cents per pound, base, Pittsburgh

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
January	1.70c	1.70c	1.60c	1.55c	1.40c	1.15c	1.45c	1.15c	1.10c	1.85c	3.60c	3.25c	3.00c	3.10c	2.65c	1.50c
February	1.70	1.70	1.45	1.55	1.40	1.10	1.45	1.20	1.10	2.15	3.75	3.25	3.00	3.70	2.30	1.40
March	1.70	1.70	1.30	1.50	1.40	1.10	1.45	1.20	1.15	2.50	4.20	3.25	2.90	3.75	2.00	1.45
April	1.70	1.70	1.20	1.50	1.40	1.20	1.45	1.15	1.10	2.65	4.50	3.25	2.65	3.65	2.15	1.50
May	1.80	1.70	1.25	1.50	1.40	1.25	1.45	1.10	1.15	2.75	4.50	3.25	2.65	3.50	2.20	1.60
June	1.80	1.65	1.30	1.45	1.35	1.25	1.45	1.10	1.15	2.75	4.50	3.25	2.65	3.50	2.00	1.65
July	1.80	1.60	1.35	1.40	1.35	1.30	1.45	1.10	1.20	2.85	5.65	3.25	2.65	3.50	1.85	1.70
August	1.70	1.60	1.40	1.40	1.30	1.35	1.45	1.15	1.15	2.90	6.80	3.25	2.65	3.50	1.75	1.80
September	1.70	1.60	1.50	1.40	1.25	1.40	1.40	1.20	1.30	2.95	6.85	3.25	2.60	3.50	1.65	2.20
October	1.70	1.60	1.50	1.40	1.20	1.45	1.35	1.15	1.40	3.00	3.25	3.25	2.65	3.20	1.60	2.05
November	1.70	1.60	1.55	1.40	1.10	1.50	1.25	1.10	1.60	3.35	3.25	3.25	2.65	3.00	1.55	2.00
December	1.70	1.60	1.60	1.40	1.15	1.55	1.20	1.05	1.75	3.50	3.25	3.25	2.70	2.65	1.50	1.90

Wire Demand Exceeds Output

Order Books Steadily Filled Far Ahead and Deferred Deliveries Extend Beyond Usual Period of Commitments—Stocks at Mills and Warehouses Depleted Early—Prices Close Year on Higher Level

WITH the exception of the first quarter, wire and nails had an active market in 1922, with mills for the most part loaded with orders and deliveries deferred much beyond the period for which these products ordinarily are sold.

Prices pursued an interesting course and closed on a moderately higher level than they opened. Wire was quoted at 2.25c, Pittsburgh, as the year opened, with nails at 2.50c. In February nails were reduced $2 to 2.40c, while wire held its place. This disturbed the usual differential until an advance of $2 was made by independents in April on all but plain and galvanized wire, restoring the differential. Prices remained fairly steady on a double series of quotations, the American Steel & Wire Co. quoting 2.35c for wire and 2.60c, Pittsburgh, for nails, while independent prices were 2.50c and 2.75c, Pittsburgh.

In September the American Steel & Wire Co. advanced prices $2 per ton along the line and independent makers marked their prices down $1, bringing the market to a uniform level which prevailed to the end of the year. At times prices were shaded and at other times some premiums for delivery were obtained. However, for the most part the recognized quotations ruled.

As soon as the dull period which followed the opening of the year was over, wire and nail makers found their greatest problem was to meet delivery requirements of users under the handicaps which prevailed most of the year. At no time was capacity production reached and much of the year not more than 50 per cent of capacity was engaged. Such stocks as existed early in the year did not suffice to meet demands and neither mills nor jobbers had material from which to fill orders, needs of users thus being reflected back to mills at once, with requests for immediate shipment.

This branch of the steel industry suffered the same handicaps as others, with the added difficulty that shipment of its raw material from mills was interfered with and delayed as much as its outgoing product. Fuel supply also was uncertain and difficulty in obtaining cars delayed shipments seriously. Through it all buyers continued to place orders for requirements to an extent that forced makers to choose carefully among the offered tonnages and book only such lots as seemed most in need. Accumulation of stocks by mills and jobbers was impossible and no reserve existed at any time.

As was the case with most steel markets, wire business was dull in January, a continuation of conditions in the preceding year. No buying of size was done until the latter part of the month, when nail demand began to assert itself. Sufficient stocks at mills had been accumulated to care for this demand and it soon fell off, the spring trade giving another period of activity in February. Shading to obtain business was resorted to at this time but did not increase the volume of buying, simply changing its distribution. Reduction of $2 per ton on nails Feb. 22, while wire held its price, caused jobbers to place orders they had been holding up.

By April such a volume of buying had arisen that independent makers advanced products $2, with the exception of plain and galvanized wire, restoring the usual differential between nails and wire. Mill books were well filled during April, deliveries began to fall back and stocks began to show signs of depletion. Buyers soon begged for shipments, as demand on all retail sellers became strong. A slackening of buying in June simply indicated practically all buyers were represented by orders on mill books, for shipments of which they were waiting.

Mills at the midyear were filled for 60 to 90 days and some orders were declined because delivery requirements could not be met. Buying was discouraged. As the railroad strike became a certainty every effort was made to obtain stocks. Bookings continued to exceed production. Raw material began to fail and production was curtailed in proportion. Shipments became more deferred. During this period there was a spread of $3 between the leading producer and independent mills.

This condition was ended Sept. 22 when the American Steel & Wire Co. advanced its quotations $2 and independent makers reduced theirs $1, placing the market on a uniform basis of 2.45c, Pittsburgh, for wire and 2.70c, for nails, a price which remained in force until the end of the year.

In the early fall production by steel mills became better and raw material for wire mills was more plentiful. Just before the September advance the usual

Wire Nail Prices, 1915-1922

Cents per pound, base, Pittsburgh

	1915	1916	1917	1918	1919	1920	1921	1922
January	1.51	2.15	3.00	3.50	3.50	3.25	3.25	2.50
February ...	1.55	2.22	3.00	3.50	3.50	3.25	3.00	2.45
March	1.60	2.38	3.16	3.50	3.45	3.25	3.00	2.40
April	1.59	2.40	3.20	3.50	3.25	3.25	3.25	2.40
May	1.55	2.50	3.50	3.50	3.25	3.25	3.25	2.40
June	1.55	2.50	3.65	3.50	3.25	3.25	3.00	2.40
July	1.59	2.50	4.00	3.50	3.25	3.25	2.75	2.40
August	1.61	2.58	4.00	3.50	3.25	3.25	2.75	2.40
September...	1.69	2.60	4.00	3.50	3.25	3.25	2.90	2.63
October	1.76	2.65	3.90	3.50	3.25	3.25	2.90	2.70
November ..	1.87	2.85	3.50	3.50	3.45	3.25	2.90	2.70
December ..	1.98	3.00	3.50	3.50	3.50	3.25	2.50	2.70

Plain Wire Prices, 1915-1922

Cents per pound, base, Pittsburgh

	1915	1916	1917	1918	1919	1920	1921	1922
January	1.31	1.95	2.95	3.25	3.25	3.00	3.25	2.25
February ...	1.35	2.10	2.95	3.25	3.25	3.00	3.20	2.22
March	1.40	2.23	3.08	3.25	3.20	3.00	3.00	2.23
April	1.39	2.25	3.18	3.25	3.00	3.00	3.00	2.25
May	1.35	2.45	3.45	3.25	3.00	3.00	3.00	2.25
June	1.35	2.45	3.60	3.25	3.00	3.00	2.75	2.25
July	1.39	2.45	3.95	3.25	3.00	3.00	2.50	2.25
August	1.42	2.53	3.95	3.25	3.00	3.00	2.50	2.25
September...	1.54	2.55	3.95	3.25	3.00	3.20	2.60	2.38
October	1.62	2.60	3.85	3.25	3.00	3.25	2.60	2.45
November ..	1.72	2.80	3.25	3.25	3.15	3.25	2.60	2.45
December ..	1.88	2.95	3.25	3.25	3.25	3.25	2.25	2.45

rush for cover was experienced and a heavy tonnage was booked at the lower price.

Car shortage intervened at the beginning of fourth quarter activities and interfered with shipments, all classes of users asking much more than could be shipped. No effort to sell further was made by most producers. Demand for shipment continued strong to the end of the year, as jobbers stocks had not been built up to cover needs of consumers. The year ended with order books much heavier than usual users seeking much material and jobbers unable to obtain reserves.

Indications for heavy production in 1923 are read in all signs now present and preparations are being made to meet the needs of the country on a larger scale than ever before.

Heavy Tonnages of Rails Ordered for 1923

ONE of the most spectacular market developments in the iron and steel industry in 1922 was the tremendous freshet of buying which burst on the rail mills during the latter part of September. On Sept. 13 Chairman E. H. Gary of the United States Steel Corp. announced rail orders for delivery until June 30, 1923, would be accepted at the current price of $40 per gross ton, base mill. Commencing with Oct. 1, the announcement stated, the price would be $43. As a result, practically every railroad in the country placed its full rail requirements for 1923 at the $40 price. It is estimated the total business aggregated 1,750,000 to 2,000,000 tons.

This buying was in sharp contrast with the placing of the 1922 rail business. The railroads were unusually slow in starting to buy for 1922, and in fact, by the middle of January the 1922 rail orders on books did not aggregate 500,000 tons. The buying of 1922 requirements, in fact, stretched out through April and in some extreme cases lagged over into July. It was believed the moral effect of this delay in rail buying was responsible in large part for the hesitancy of consumers generally in getting the 1922 buying movement started. The 1922 rail tonnage was placed at $40 base.

The average prices paid for steel rails in the United States from 1901 to 1922 follow:

1922	$40.75
1921	45.68
1920	52.64
1919	47.50
1918	57.00
1917	38.00
1916	32.75
1902 to 1915	28.00
1901	27.40

Demand for light rails, although interrupted by the coal strike of April 1 and the railroad strike of July 1, was fairly well maintained all through 1922. The bulk of the buying was by coal companies, but the lumber, general contracting, traction and power industries all furnished their share of orders. Competition from rerollers was in evidence all year, but particularly in the beginning of the year, and the rerolled rails brought from $1 to $3 per ton lower than the prices on billet-rolled rails. In some instances, new rails were sold on the same basis as rerolled rails. The market on light rails at the beginning of the year was quoted 1.50c base Pittsburgh. By September, the market had gone as high as 2.00c to 2.25c, and at the close of the year was quoted around 2.00c.

Practically all of the car buying of the year was domestic. Export buying was negligible. The comparative statement of new car buying by domestic railroads during recent years follows:

	1922	1921	1920	1919
January	11,000	1,700	4,500	3,180
February	14,500	200	7,000	60
March	12,000	1,400	5,500	150
April	31,500	350	20,500	575
May	18,250	250	8,000	360
June	13,100	1,500	5,500	1,010
July	13,700	900	7,000	2,510
August	1,610	150	7,000	2,125
September	10,350	550	3,500	3,975
October	12,700	6,500	6,500	4,750
November	18,500	7,000	2,500	350
December	12,500	550	2,500	1,000
Total	169,710	22,050	80,000	20,045

Locomotives ordered in 1922 aggregated close to 2300 as against about 400 in the preceding year. August was the best month, with orders for 480 locomotives and April second, with 355.

Light Rail Prices by Quarters, 1913-1922

Per pound and per gross ton

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Jan. 1	1.25c	1.25c	1.07c	1.55c	$50.00	3.00c	2.75c	2.45c	3.00c	1.50c
April 1	1.25c	1.25c	1.07c	2.10c	55.00	3.00c	2.45c	3.25c	2.50c	1.60c
July 1	1.25c	1.25c	1.07c	$47.00	$70-$80	3.00c	2.45c	3.75c	2.20c	1.75c
Oct. 1	1.25c	1.25c	1.25c	47.00	75.00	3.00c	2.45c	3.50c	1.65c	2.15c

Warehouses Encounter Heavy Demand

STEEL warehouses found 1922 to their liking, many factors adding largely to their prosperity and keeping steady demand for their materials. The ill wind from the mill point of view aided steel stores by diverting some demand to warehouse.

Coming as a heritage from 1921, the early part of the year was slow. Prices were reduced, shading followed and the outlook was not bright. Mills cut prices late in the first quarter and store prices followed in line. With mills hungry for tonnage and deliveries made within a week, stores had relatively little demand.

As second quarter was well under way mill prices advanced, followed by warehouse quotations. Orders for steel from stock came in large volume, as users were taken unawares by mill conditions and found themselves without stocks and unable to obtain shipments.

When lower rail rates were put into effect July 1, warehouse prices were adusted to conform to the new rates.

Interference with mill delivery by the fuel and shop strikes gave stores added demand on their stocks and at the same time limited their shipments from mills. Advances were made from time to time with mill prices.

Warehouses as a rule read the signs aright and in March placed large orders for their requirements, anticipating the later buying and higher prices.

Embargoes by railroads in October, in the effort to relieve congestion of freight, cut off mill shipments to a large extent in the Central West and consumers caught without sufficient material resorted to stores to meet their requirements.

Prices closed firm and indications for a continuance of demand into the new year were seen in every sign of the market. The value of the steel warehouse as a reservoir to equalize supply of steel to the consumer in times of stress was proven and the cost of the service has not compared with the benefit when mills could not get out their production.

Shape Tonnage Is at Highest Point

Structural Awards in 1922 Nearly 1,500,000 Tons—Orders Pending for 1923 Aggregate Heavy Tonnage—Work Placed Last Year Included Large Individual Items —Industrial Building Gains—Prices Slightly Higher

SHARP increase in bookings, accompanied by a material advance in prices, featured the structural shape market in 1922. It is estimated the year's tonnage will be near 1,500,000, the highest point ever attained. In 1916 1,493,000 tons was booked. Eastern structural activities were on a scale never before paralleled and in all districts without exception the improvement was most pronounced. Especially notable was the extent to which demand generally was maintained up to the close of the year. This is well above normal and a prospective tonnage is piling up which by spring should reach heavy proportions.

While commercial and civic work absorbed the bulk of last year's tonnage, there was a marked improvement in industrial building, particularly during last half. There was also considerable bridge work, the outstanding in which was the Castleton, N. Y., bridge of the New York Central railroad, involving 23,000 tons.

Shape prices in February, following the downward trend which had prevailed for almost two years, had reached the lowest point since 1914. The market generally held at 1.35c to 1.40c, Pittsburgh, but in a few cases around 1.30c, Pittsburgh, was done. One lot of about 10,000 tons was reported placed at 1.27½c, Pittsburgh. By March the market began to move definitely upward and by Sept. 1 it had reached a range of 2.10c to 2.25c, with some prices reported at 2.50c.

The improvement in buying began early in the year. By the end of February, most eastern shape mills were running 50 per cent of capacity, and those in the other leading districts were not far below. Fabricating shops were averaging 35 to 40 per cent. In the New York metropolitan district, the tonnage booked during the first two months for building work alone, exclusive of bridges, piers, subway extensions, etc., amounted to more than 50,000 tons, or 100 per cent above the average for that season. An unusual volume of business was also reported in the Middle West.

April was the most active month of the entire year, according to the census bureau. More than 190,000 tons were booked by the various fabricating shops throughout the country, or approximately 86 per cent of capacity. However, the coal strike, which started April 1, exerted a depressing influence which was reflected later.

Prices throughout this period moved rapidly upward. By the middle of May shapes had advanced to a range of 1.60c to 1.70c, Pittsburgh, and quotations on fabricated material began to stiffen perceptibly. The second quarter closed with shapes strong at 1.70c, Pittsburgh, and with premiums for nearby deliveries.

The rail strike July 1, coming on the heels of the coal strike, still in effect, made operating conditions during the summer months most trying. Shape prices, reflecting this situation, advanced to a range of 2.00c to 2.25c, Pittsburgh, and 2.05c to 2.25c, Chicago, by Sept. 1. Despite these conditions, a substantial tonnage was booked.

In September, business continued brisk. Fuel supplies became easier, and production improved. However, a shortage of cars with accompanying embargoes was an offsetting factor.

Shape prices by the beginning of the fourth quarter had become established rather definitely at a range of 2.00c to 2.10c, Pittsburgh. By the early part of November the market had about approached a flat level of 2.00c, Pittsburgh, and this figure was being shaded $1 to $2.

An interesting development was the completion of the organization of the National Steel Fabricators association, founded on a constitution adopted in November, 1921. Headquarters were established in April at Cleveland, with Lee H. Miller, formerly structural sales agent for the Bethlehem Steel Corp. in that city, as managing director. Later the organization changed its name to the American Institute of Steel Construction. Its membership by that time included 113 companies.

Disbandment in 1922 of the Bridge Builders and Structural society, followed the Supreme Court decision in Hardwood Lumber case. The society ceased to function after March 31 and the bureau of census at Washington undertook the monthly compilation of building awards. Statistics soon began to show an increase in the country's estimated fabricating shop capacity which in November, and revised to April showed a rating of approximately 211,510 tons as against the 180,000 reported by the society.

Some of the larger tonnages awarded in 1922 were: 23,000 tons for the bridge at Castleton, N. Y.; 20,000 tons for the National Tube Co. at Gary, Ind.; 15,000 tons for the Stevens hotel, Chicago; 11,000 tons for ore docks for the Great Northern railroad; 11,000 tons for work in connection with the New York-New Jersey vehicular tunnel, and 10,500 tons for a power plant for the Brooklyn Edison Co.

Awards since December, 1918, were:

	1922	1921	1920	1919
Jan.	72,100	32,000	135,000	21,000
Feb.	78,700	25,600	171,000	22,500
March ...	139,300	52,300	150,400	32,300
April	193,520	55,900	122,250	48,100
May	173,588	50,800	110,700	88,200
June	154,770	66,900	90,400	117,000
July	143,907	60,200	90,400	133,200
Aug.	146,621	59,000	72,000	141,000
Sept.	137,485	86,000	77,400	141,000
Oct.	121,150	97,800	45,600	139,500
Nov.	99,040	99,800	49,200	124,200
Dec.	.....	71,500	47,000	153,000
Total ..	1,460,181	759,100	1,161,359	1,154,,00

*Eleven months.

Average Monthly Structural Shape Prices, 1907-1922

Cents per pound, base, Pittsburgh

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
January	1.70	1.70	1.60	1.55	1.40	1.15	1.45	1.20	1.10	1.85	3.10	3.00	2.80	2.65	2.45	1.50
February	1.70	1.70	1.45	1.55	1.40	1.15	1.45	1.20	1.10	2.05	3.25	3.00	2.80	3.15	2.25	1.40
March	1.70	1.70	1.30	1.50	1.40	1.15	1.45	1.20	1.15	2.40	3.45	3.00	2.70	3.25	2.10	1.45
April	1.70	1.70	1.20	1.50	1.40	1.20	1.45	1.20	1.15	2.50	3.70	3.00	2.45	3.25	2.15	1.50
May	1.70	1.70	1.25	1.50	1.40	1.25	1.45	1.15	1.20	2.50	4.00	3.00	2.45	3.25	2.20	1.60
June	1.70	1.65	1.30	1.45	1.35	1.25	1.45	1.10	1.20	2.50	4.00	3.00	2.45	3.25	2.05	1.65
July	1.70	1.65	1.35	1.40	1.35	1.30	1.45	1.10	1.25	2.50	4.50	3.00	2.45	3.25	1.90	1.70
August	1.70	1.60	1.40	1.40	1.35	1.35	1.45	1.15	1.30	2.50	4.50	3.00	2.45	3.15	1.75	1.80
September	1.70	1.60	1.50	1.40	1.35	1.40	1.40	1.20	1.35	2.60	3.75	3.00	2.45	3.10	1.70	2.00
October	1.70	1.60	1.50	1.40	1.30	1.45	1.35	1.15	1.40	2.70	3.00	3.00	2.45	3.10	1.60	2.00
November	1.70	1.60	1.55	1.40	1.20	1.50	1.30	1.10	1.65	2.90	3.00	3.00	2.45	3.00	1.60	2.00
December	1.70	1.60	1.60	1.40	1.15	1.55	1.25	1.05	1.75	3.00	3.00	3.00	2.50	2.45	1.50	1.95

Sheet Activity a Strong Feature

Mills Experience Sustained and Constantly Increasing Demand for Full-Finished Automobile Stock, Galvanized and Other Grades—Operations Highest in Two Years—Better Prices Realized

OUTSTANDING among the features of the sheet market in 1922 was the sustained and ever-increasing demand for full-finished automobile sheets and other grades used in automotive construction. The large and widespread consumption of galvanized and other sheets utilized in building houses, garages, apartments and industrial structures likewise is noteworthy. The movement in this direction started in 1921, gathered impetus and forged ahead to a commanding place in the operation of hot sheet mills for the greater part of 1922. Other grades, including the specialties, were in more or less keen demand throughout practically all of the year 1922.

While in 1921 producers of blue annealed sheets encountered real competition from plate mills, this was lost sight of early in the first quarter of 1922. Large tonnages of black sheets were sold. Consumers of electrical sheets, as well as stove and agricultural implement manufacturers, purchased steadily, in practically every section of the country. For the American Sheet & Tin Plate Co., specifications were so heavy the first six months of the year that it enjoyed the fourth best first half of its history.

In connection with the huge automotive sheet demand, this did not get under way until the latter part of the first quarter. Early April found customers asking that shipments be expedited and shortly thereafter requests became numerous that sheetmakers double up tonnage reservations. Many producers of the low or medium-priced cars enlarged their production programs from time to time and several exceeded all previous output records. One advanced from 35 to 500 cars daily at a period in the second quarter. Not only were sizable tonnages of galvanized sheets purchased for building construction, but specifications from railroad car manufacturers and car roof repairers were large. This was noticeable in the last half when railroad car repairing became more urgent, owing to the improvement in industry and demand for transportation facilities.

The coal strike April 1 found the sheet industry well fortified with 60 to 90 days' supply of coal on hand. Later in an indirect way the effects were more severe. The industry perhaps was more adversely affected by the railroad strike of July 1, with attendant difficulties such as car shortages, freight embargoes, etc. These made necessary the piling of considerable tonnage on sheet mill floors, since the trucking of sheet bars to plants for conversion was not practicable and the shipment of the finished product by truck could only be made in a limited way. Early in the third quarter, sheet deliveries were deferred six to 12 weeks, hot weather with curtailed working forces being no small contributing factor. This condition rapidly grew worse.

The year 1922 started with the American Sheet & Tin Plate Co. operating 75 per cent of its sheet mills. Except for a slight falling off in February this worked steadily upward until a 90 per cent basis was reached early in April, which level was sustained for about two months. The latter part of June it dropped to 85 per cent, going to 73 per cent in September, where it remained until the forepart of December when 80 per cent again was possible. The interest finished the year with approximately 85 per cent of sheet mills engaged.

At no time during the year were op-

Average Monthly Sheet Prices, 1913-1922

Cents per pound, Pittsburgh

NO. 28 BLACK SHEETS

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922	$3.00	$3.00	$3.00	$3.10	$3.15	$3.15	$3.15	$3.25	$3.40	$3.50	$3.35	$3.30
1921	4.35	4.20	3.90	3.90	4.00	3.90	3.35	3.05	2.80	3.00	2.95	3.00
1920	5.00	6.00	6.00	6.00	7.00	7.00	7.00	7.00	7.00	7.00	6.05	4.47
1919	4.70	4.70	4.60	4.35	4.35	4.30	4.30	4.35	4.35	4.35	4.35	4.35
1918	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1917	4.55	4.55	5.05	5.75	7.00	8.15	9.00	9.00	8.75	7.75	5.30	5.00
1916	2.55	2.60	2.75	2.90	2.95	2.90	2.90	2.75	2.85	3.20	3.65	4.45
1915	1.80	1.80	1.80	1.80	1.80	1.80	1.75	1.85	1.90	2.05	2.20	2.50
1914	1.85	1.95	1.95	1.90	1.85	1.80	1.80	1.90	1.95	1.95	1.90	1.80
1913	2.30	2.35	2.35	2.35	2.35	2.30	2.25	2.20	2.10	2.00	1.95	1.90

NO. 10 BLUE ANNEALED SHEETS

1922	$2.25	$2.25	$2.25	$2.35	$2.40	$2.40	$2.40	$2.45	$2.50	$2.60	$2.60	$2.50
1921	3.55	3.35	3.05	2.95	3.10	3.00	2.55	2.40	2.30	2.50	2.40	2.25
1920	4.05	5.50	5.50	4.85	5.00	5.00	5.00	5.00	5.00	5.00	4.95	3.65
1919	3.90	3.90	3.80	3.55	3.55	3.50	3.50	3.55	3.55	3.55	3.55	3.55
1918	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
1917	4.15	4.40	4.70	5.35	6.65	7.55	8.50	8.50	8.50	7.85	4.60	4.25
1916	2.45	2.60	2.85	3.00	3.05	3.10	3.00	3.00	2.90	3.15	3.30	3.90
1915	1.30	1.30	1.30	1.30	1.35	1.35	1.35	1.35	1.50	1.60	1.85	2.25
1914	1.35	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.40	1.40	1.40	1.35
1913	1.70	1.75	1.75	1.75	1.75	1.75	1.70	1.65	1.60	1.55	1.45	1.40

NO. 28 GALVANIZED SHEETS

1922	$4.00	$4.00	$4.00	$4.10	$4.15	$4.15	$4.15	$4.25	$4.40	$4.50	$4.35	$4.35
1921	5.70	5.50	5.05	4.90	5.00	4.90	4.35	4.05	3.80	4.00	3.95	4.00
1920	6.35	7.00	7.25	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.35	5.85
1919	6.05	6.05	5.95	5.70	5.70	5.65	5.65	5.70	5.70	5.70	5.70	5.70
1918	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
1917	6.55	6.80	6.80	7.55	8.80	9.95	10.25	10.25	9.70	8.80	6.50	6.25
1916	4.75	4.75	4.80	4.85	4.85	4.80	4.35	4.25	4.20	4.45	5.05	6.25
1915	2.75	3.00	3.40	3.30	3.40	4.45	4.55	3.95	3.65	3.50	3.90	4.75
1914	2.85	2.95	2.95	2.90	2.80	2.75	2.75	2.85	2.95	2.95	2.85	2.80
1913	3.45	3.50	3.50	3.50	3.40	3.40	3.30	3.25	3.15	3.05	2.95	2.85

erations curtailed for lack of business. Enough specifications always were in hand to run full, but one deterrent after another was encountered and sometimes these difficulties, such as steel shortage, limited transportation facilities, curtailed labor forces, or restricted fuel supplies did not come singly.

Independents were affected similarly. The first quarter started with approximately 50 per cent operations in the Mahoning valley but the first quarter finished with 65 per cent engaged. April commenced with 76 per cent but by the end of the second quarter the figure had risen to 98 per cent, the highest rate in two years. This dwindled in the third quarter when all mills were piling sheets, some having as much as 250 carloads on hand at one time awaiting car placements. By October, independents were down to 50 per cent although in November, the general average mounted and the year finished with an average of 75 or 80 per cent.

Prices of sheets showed a consistent upward trend all through the year although it is true that in the case of independent producers, prices suffered declines in November and December. The American company which followed its usual conservative price policy all year, started the year with 2.25c, 3.00c, 4.00c and 4.35c, base Pittsburgh, on blue annealed, black, galvanized, and full-finished automobile sheets, respectively. It followed on April 5 the $3 per ton increase inaugurated by a Wheeling interest the latter part of March. These prices, 2.40c, 3.15c, 4.15c and 4.50c applied for the remainder of the second quarter. Later the American company announced these prices to apply to the third quarter. On Aug. 15, it announced its fourth quarter prices, instituting a $2 advance on blue annealed to 2.50c, and a $4 increase on the other three grades, black, galvanized and full-finished, of 3.35c, 4.35c and 4.70c, respectively. These levels were reaffirmed on Nov. 23 for the first quarter of 1923. The year ended with the leading interest fully obligated for its entire output for January, February and March and on some grades, part of April, with a little under 75 per cent of the obligations in the form of actual specifications.

Costs Govern Selling Policies

During that period of steady prices by the leading interest, other makers were governed in their selling policies by costs. The first increase of the year, named in the latter part of March, was inaugurated by an independent maker. Beginning early in April independents, except in the Chicago district, maintained an entirely separate and distinct price level which at various times was from $2 to $11 above the quotations of the leading interest. On April 19 a Youngstown interest announced a $7 per ton increase which was not generally followed. However, as operations became more difficult, and fuel and labor costs mounted, sporadic price increases were made. Some of these were the result of buyers' offers of premiums. At one time 5.25c was paid for automobile sheets when the leading interest's price was 4.70c. In blue annealed, black and galvanized the peaks apparently were 2.85c, 3.85c and 4.85c respectively. It often was easier to secure the higher figures for galvanized than for black, owing to the cost of spelter. The price on full-finished automobile sheets for the last quarter was 5.00c, or $6 per ton above the American company's level. Later in December, however, some independents were taking business at 4.85c.

In October, production by independent mills reporting to the National Association of Sheet and Tin Plate Manufacturers reached the highest point. Statistics first were begun to be compiled in February, 1920. The total production of the 68.9 per cent of 658 hot mills in the United States reporting to the association was 243,476 tons, an increase of 11.4 per cent over September. Shipments increased 9 per cent to 223,874 tons while sales increased 3.8 per cent to 208,916 tons. While 108,291 tons were in stock Nov. 1 awaiting shipment, only 20,690 tons were in stock unsold.

Cast Pipe Orders Numerous; Total Large

MAKERS of cast iron pipe started 1922 with long lists of tonnages they believed cities would buy, but expectations were not realized. However, as much pipe was sold from month to month as could be made and shipped. Yard stocks were cleaned up and the year ends with enough business on shop books to carry through the winter.

It was a contradictory year in many respects. The expected large tonnages disappointed and when it was found a large order book had been accumulated no one could say from where it had come. The secret was that an unprecedented number of orders for a carload or two from cities, railroads and industrial interests had been booked.

Prices strengthened during the year as shops assumed an increasingly easy position and held the advances without difficulty, probably largely because of the absence of competition for large lots. Difficulty of shipment from the South interfered with delivery of cast pipe through much of the year, especially in the middle months. Later in the year conditions grew better and the congestion was cleared to a great extent, although delay in forwarding caused pipe laying to be deferred to next year in a large number of cases.

NEW YORK

	1918	1919	1920	1921	1922
January	55.35	66.20	67.30	63.30	47.30
February	55.35	62.70	70.30	63.30	47.30
March	55.35	61.65	71.30	63.30	47.60
April	55.35	57.70	73.30	63.30	48.80
May	56.55	56.70	76.30	61.30	48.80
June	61.35	52.70	76.30	52.70	49.80
July	62.30	52.70	76.30	48.55	53.30
August	62.50	53.10	76.30	47.05	54.50
September	62.70	54.30	77.20	45.30	55.30
October	67.50	56.70	77.20	47.55	55.30
November	67.70	58.30	77.20	47.30	55.30
December	67.70	61.30	77.20	47.30	....

CHICAGO

	1918	1919	1920	1921	1922
January	54.30	64.30	67.55	64.10	41.60
February	54.30	61.80	71.30	64.10	42.10
March	54.30	60.55	72.80	64.10	43.00
April	54.30	56.80	74.40	64.10	43.85
May	55.50	54.80	76.80	64.10	44.70
June	60.80	51.80	76.80	51.50	46.60
July	62.07	52.60	76.80	47.60	45.55
August	61.85	54.80	76.80	44.35	45.20
September	61.80	55.80	81.50	42.90	47.85
October	66.80	59.80	83.10	42.60	52.20
November	66.80	59.80	83.10	42.60	51.20
December	66.80	63.80	83.10	42.60	....

BIRMINGHAM

	1918	1919	1920	1921	1922
January	49.00	58.75	60.00	55.00	35.00
February	49.00	55.00	64.50	55.00	34.00
March	49.00	54.50	66.00	55.00	33.00
April	49.00	53.00	67.00	55.00	34.15
May	50.20	52.00	70.00	55.00	34.70
June	55.00	48.00	70.00	42.50	37.00
July	55.00	48.00	70.00	40.00	37.00
August	55.00	48.00	70.00	39.50	37.30
September	55.00	48.00	72.40	38.00	40.00
October	60.00	50.00	74.00	36.50	43.00
November	60.00	53.00	74.00	35.20	43.00
December	60.00	56.75	74.00	35.00	....

High prices for pig iron throughout the year kept up the cost of cast pipe and when the decline in iron came late in the year pipemakers had no interest in the market, because of their sold-up condition, thus pipe was not affected.

A number of extensive improvement programs are being mapped out for 1923 by several cities, giving promise of placing some of the large tonnages missing in 1922. Deferment of much work until the coming year, because of nondelivery of pipe last year, will also give added impetus to demand. Every indication is for a larger volume of business than in the past year and buying of raw materials for production of the necessary tonnage has been undertaken on a large scale.

Producers of soil pipe and fittings found the year encouraging, the boom in building making large demand for this class of pipe. Stocks of pipe were called on throughout the year for large tonnages to meet the sanitary requirements of the unusually large number of apartment and residence projects.

Metals Consumption Was Large

Recovery from Depression of 1920-21 Is Reflected in Better Demand for Metals—Consumption in Some Cases Paralleled War Years—Operations Restricted by Labor and Tariff Difficulties—Stocks Low

CONDITIONS in the principal nonferrous metal industries in 1922 represented a considerable recovery from the sharp depression in these industries during 1920 and 1921. The year was marked by steady increases in production to meet growing demands, but the operation of additional capacity was restricted by labor and traffic difficulties. In the latter part of 1922, American consumption of copper, lead, zinc and aluminum reached rates in excess of all peacetime years and in many cases paralleled the activity of the peak war years. Prices rebounded abruptly from the low levels of the previous year, yet in most cases to levels which permitted only small operating profits to smelters, refiners and fabricators. Producers' stocks of metals in all lines were worked down to a few weeks' supplies by Dec. 31.

Electrolytic copper prices fluctuated within narrow limits during most of the year, between 13.75c and 14.25c, delivered, dipping below 13.00c in the spring. Domestic output increased from about 20,000,000 pounds as of December, 1921, to nearly 100,000,000 pounds as of December 1922. The American supplies, however, were augmented by increasing South American tonnage. The ability of one of the South American companies to produce as low as 6.00c a pound kept the market in check during the last half.

The zinc industry experienced a decided recovery in 1922. As the year began smelter stocks amounted to 66,608 tons. These were reduced steadily to 18,043 tons on Nov. 1. In November there was a slight increase. Production, in the meantime, had risen from 22,013 tons in December, 1921, to 40,200 tons in November, 1922. Shipments increased at the same rate. Prices advanced from 4.85c, East St. Louis, in December, 1921, to a high of 7.40c in November, reacting in December.

The most important single development in the lead market was the increase in the duty from 25 per cent ad valorem to 2½ cents specific, on pig lead and base bullion. Consumption of lead was so heavy during the entire year that the lower cost American producers then operating could not meet the demand and considerable tonnages of Mexican and other foreign lead filled the gap. The more attractive prices stimulated production of higher cost properties and as the year closed supply was more nearly ample. Lead prices advanced from 4.70c, New York, in December, 1921, to 7.10c in December, 1922.

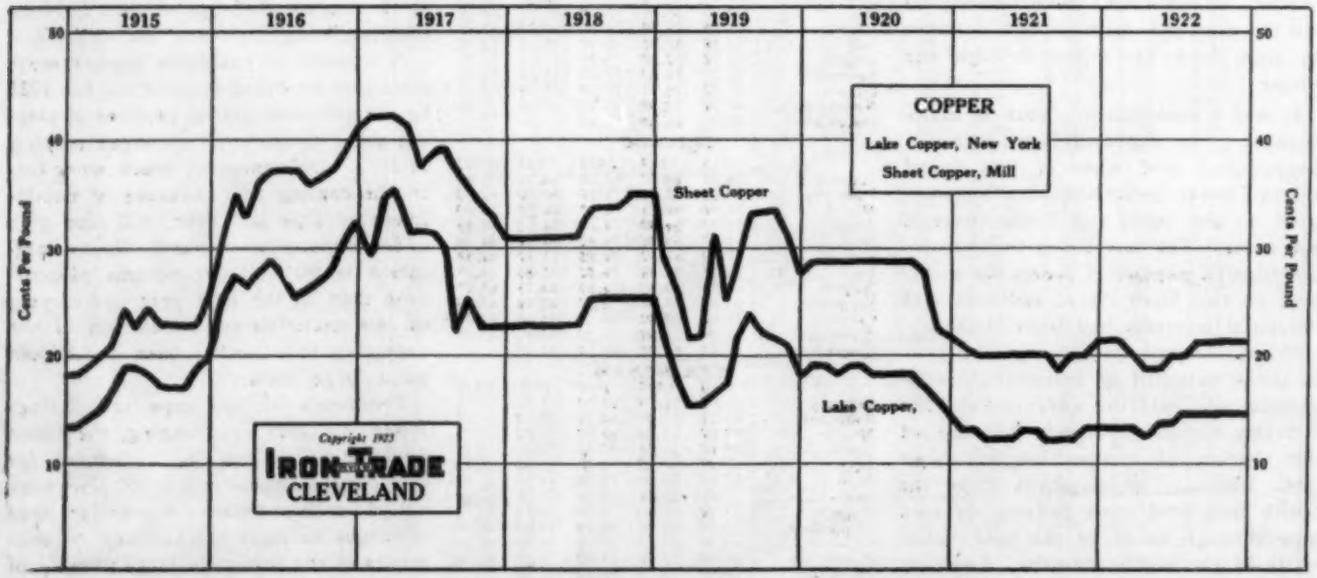
The tin market pursued an erratic course during the year, London speculators controlling the world market most of the time. The United States as in 1921, bought more than its pro-

(*Concluded on Page 100*)

Average Monthly Nonferrous Prices in 1922

Prompt, wholesale lots, cents per pound

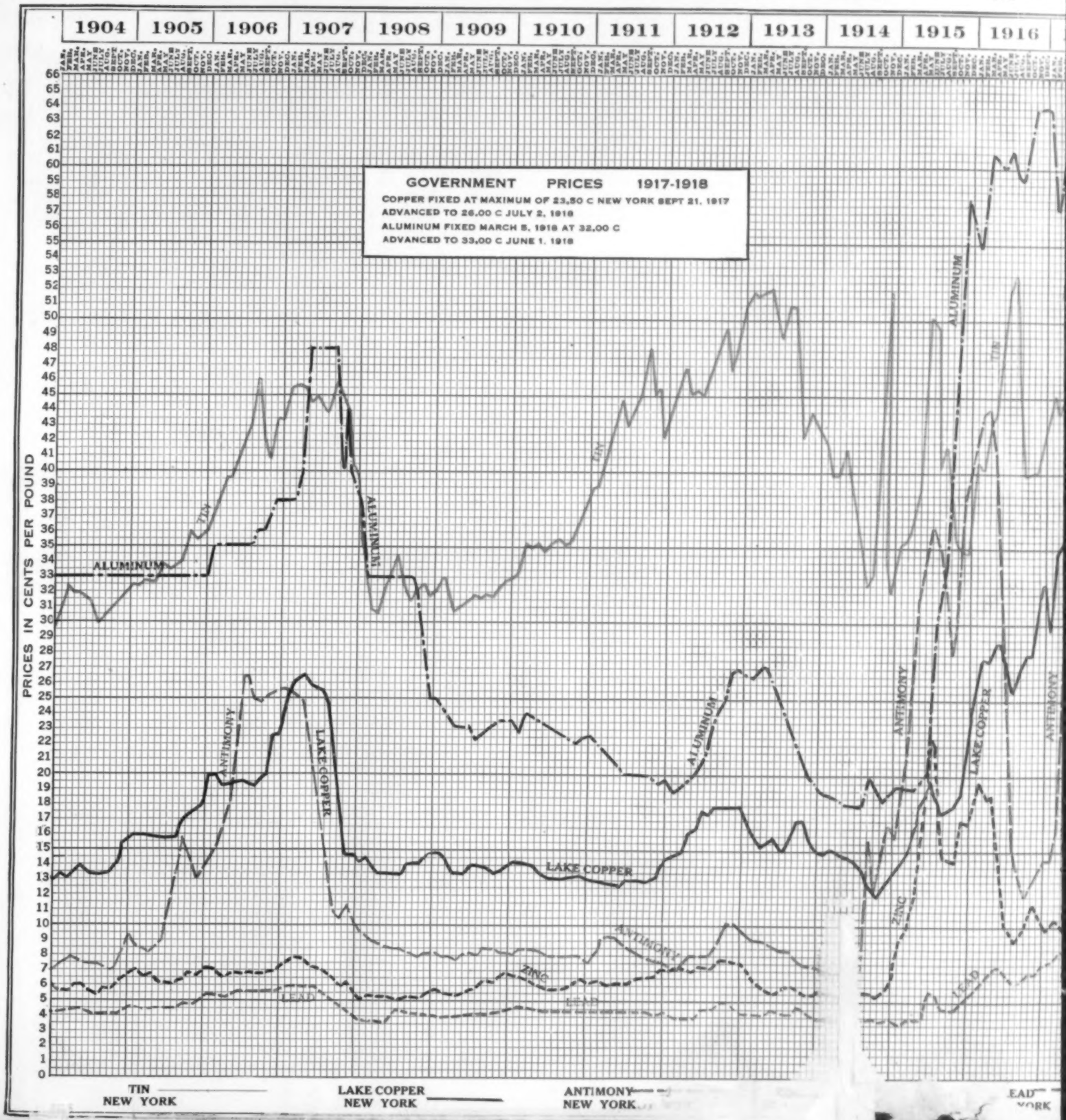
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec. to 19th
Tin, spot Straits New York	32.052	30.722	29.173	30.637	30.935	31.551	31.792	32.392	32.376	34.66	36.712	37.10
Electrolytic copper delivered	13.815	13.262	12.909	12.865	13.40	13.913	13.973	14.00	14.00	13.922	13.846	14.14
Lead New York, outside	4.725	4.702	4.726	5.15	5.547	5.781	5.727	5.847	6.213	6.69	7.176	7.260
Zinc, prime western, E. St. L....	4.717	4.50	4.654	4.528	5.108	5.355	6.618	6.243	6.576	6.86	2.151	7.165
Aluminum, outside 98-99	17.642	17.43	17.559	17.768	17.983	18.10	18.00	17.875	18.25	20.50	21.375	22.50
Antimony, spot...	4.465	4.386	4.24	4.853	5.431	5.131	5.052	5.283	6.43	6.79	6.545	6.40



THE PARALLEL TRENDS OF LAKE AND SHEET COPPER ARE SHOWN HERE

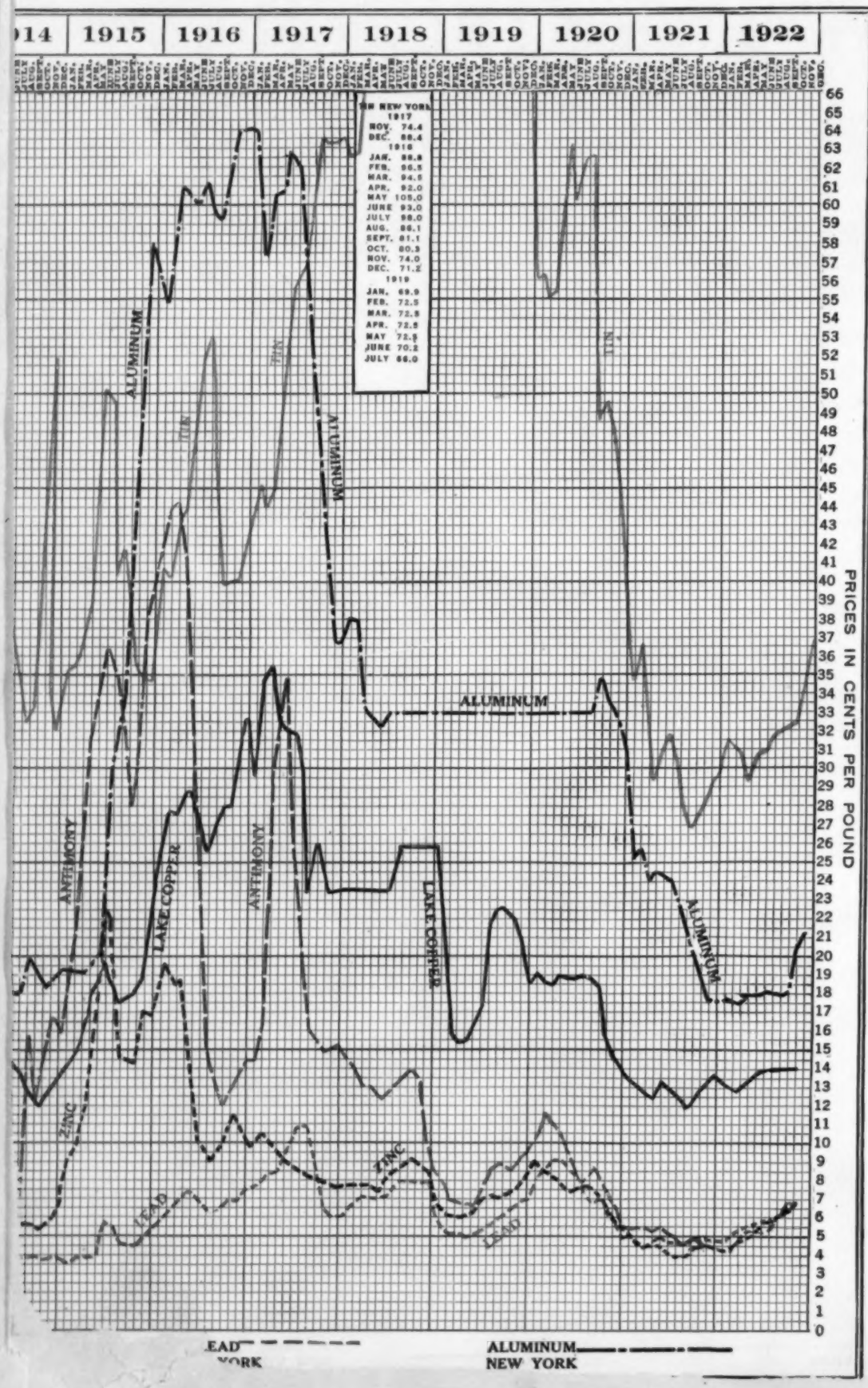
IRON TRADE REVIEW

Fluctuations in prices of pig tin, aluminum, antimony, lake copper,



RADE

ny, lake copper, zinc and lead, 1904-1922



Scrap Movement Is Uncertain

Speculation Is Controlling Influence in Most of the Year's Market—Railroad Conditions Have Important Bearing—Buyers Employ Cautious Tactics but Tonnage Moved Is Probably in Normal Rate to Steel Production

SPECULATION and uncertainty marked much of the year in iron and steel scrap, with a steady rise in prices for 10 months and a dip during the closing weeks of the year. Many obstacles appeared to prevent freedom of trading and dealers found themselves unable to judge accurately the trend of affairs.

During much of the year the railroad situation in one or another of its phases presented itself as an important factor in the market. During the strike of shopmen little scrap was brought to market by railroads and as soon as the coal strike had ended, car supply was diverted and scrap interchange reduced.

A virtual strike of buyers was in effect part of the year. Rising prices caused consumers to hold off whenever possible in an effort to depress the market. Other conditions were at work to cause a steadily ascending quotation and the bear tactics did not avail. While the market appeared slow on the surface throughout the year it is probable the aggregate tonnage moved to consumers was normal in proportion to the production of steel.

The advance from January to October was about 50 per cent over the average for the earlier month, this figure holding for several important grades at important centers through the country. The decline toward the end of the year was not sharp.

January was a dull month and not until the later days of February did the market feel an uplift. Steelmakers and foundries then had begun to feel a quickening of demand for their products and sought raw material supplies. Prices responded and on renewed buying a month later, they advanced another step. Taking of tonnages by users continued through the first quarter. and the market broadened steadily. As supply and demand became more nearly balanced a speculative interest was discernible and the market became irregular. Buyers resisted prevailing prices, but in spite of this, quotations continued their upward march. Consumers apparently took their requirements in spite of their apparent indifference and by the middle of the year the situation was quiet. Consumers then really had retired from the market.

Irregularity was the rule, both as to the relation of various scrap grades and as to geographical location. Outside factors caused some grades to be active while depressing others. At times when pig iron was difficult to obtain cast scrap became of importance. Some railroad specialties, such as knuckles, couplers and springs, relied on by steel foundries, were in small supply and their prices moved upward until at times they were much out of their usual relationship with other grades.

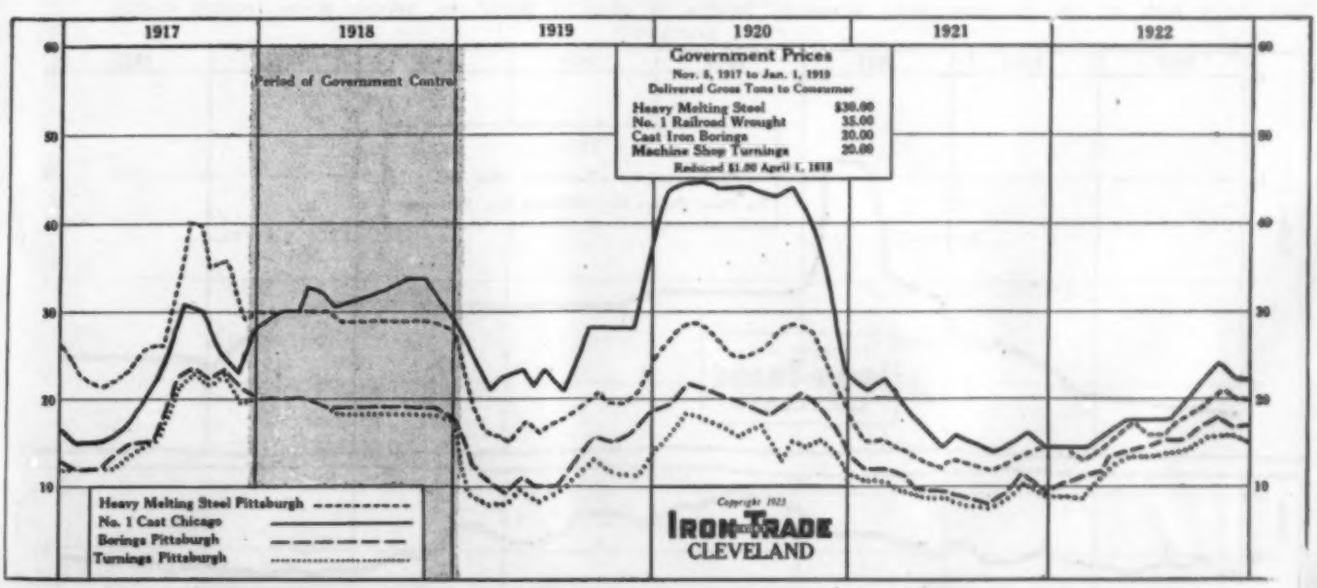
During the third quarter the pinch caused by lack of railroad scrap became more severe, and car shortage added to the difficulty in meeting requirements. Demand increased as general business improved in September. This activity continued until the beginning of the final quarter, when the market met a reverse and began to soften.

As is the case often in the scrap market, no apparent reason preceded the change, but it continued and shortly the reason was found in the sudden drop of the pig iron market, which it heralded. About the same time better tonnages of railroad scrap were offered.

Consumers again deserted the market and refused to buy, although increased plant operations in most lines seemed to indicate need for larger supplies. Country lots moved more freely. As the fuel situation cleared and cars were released, railroad tonnages accumulated and other factors enlarged the available supply. Obsolete machine tools sold by the government as scrap created a heavy supply of cast grades at Chicago, as one factor.

Toward the end of the year dealers traded more actively to obtain tonnages to apply on contracts expiring at the end of December. This gave the market a livelier appearance and checked the decline. Whether this check is temporary or the market has turned and will make another advance in the coming year is not yet apparent.

Every indication seems to point to heavy demand for iron and steel products in 1923 and scrap supplies on a corresponding scale will be required to keep up operation. Railroad activities



TREND OF PRICES OF LEADING GRADES OF IRON AND STEEL SCRAP, 1917-1922

are to be increased, as indicated by track and car purchases and this should release the larger tonnages of scrap held back during the year just closed.

The average monthly prices on No. 1 cast scrap at Pittsburgh, Chicago and eastern Pennsylvania during 1922 were as follows:

HEAVY MELTING STEEL

	Pittsburgh	Chicago	East Pa.
January	14.50	11.19	11.50
February	13.69	11.12	11.87
March	14.95	12.05	12.85
April	16.50	13.56	13.75
May	17.00	14.65	14.70
June	16.87	14.44	15.00
July	16.50	15.12	15.00
August	17.10	15.80	15.00
September	19.75	18.13	16.75
October	21.37	18.50	17.87
November	20.30	17.40	16.80
December	....	....	....

The average monthly prices on heavy melting steel at Pittsburgh, Chicago and eastern Pennsylvania during 1922 were as follows:

NO. 1 RAILROAD WROUGHT

	Pittsburgh	Chicago	East Pa.
January	12.00	11.81	15.00
February	11.82	11.62	15.00
March	12.00	12.25	15.20
April	13.50	13.25	15.63
May	14.60	14.35	16.80
June	15.50	14.19	17.25
July	15.00	15.19	18.00
August	15.00	16.35	18.00
September	16.75	19.94	20.75
October	19.00	20.38	22.00
November	19.00	18.00	21.00
December	....	....	....

The average monthly prices on No. 1 railroad wrought at Pittsburgh, Chicago and eastern Pennsylvania during 1922 were as follows:

NO. 1 CAST

	Pittsburgh	Chicago	East Pa.
January	16.00	14.00	16.75
February	16.00	14.37	16.50
March	16.40	15.10	17.00
April	17.25	16.13	17.38
May	18.50	17.40	17.90
June	18.75	17.31	18.50
July	19.25	17.63	18.00
August	19.00	19.70	18.00
September	21.75	23.81	20.63
October	23.38	24.00	23.00
November	23.50	22.90	21.90
December	....	....	....

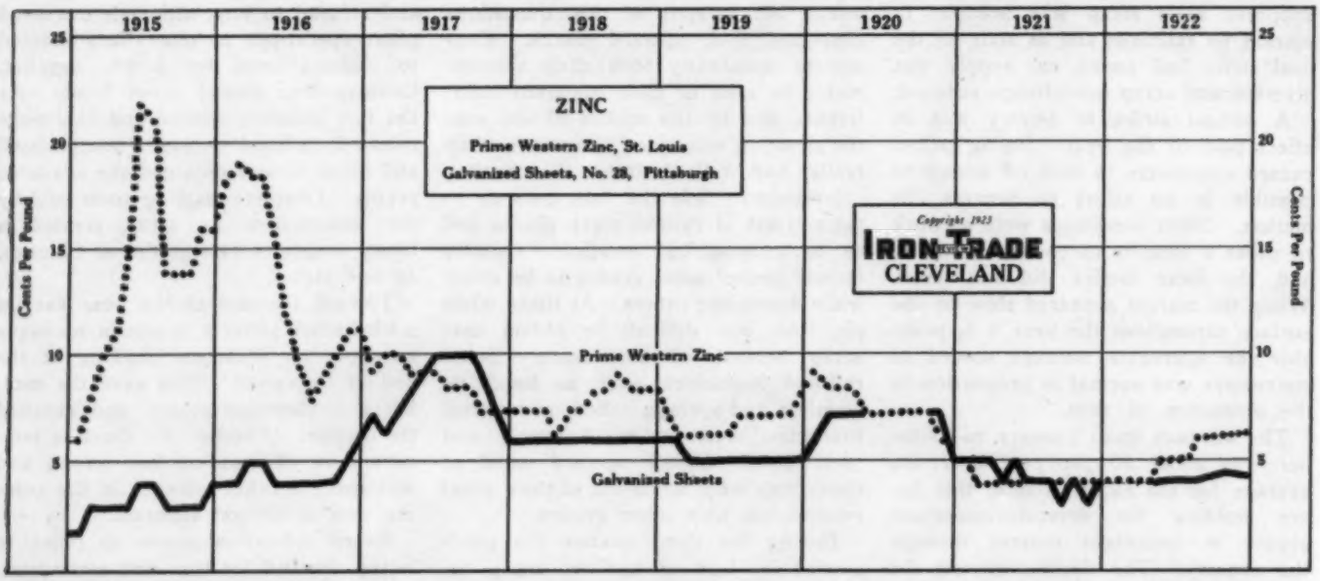
Metals Consumption Large

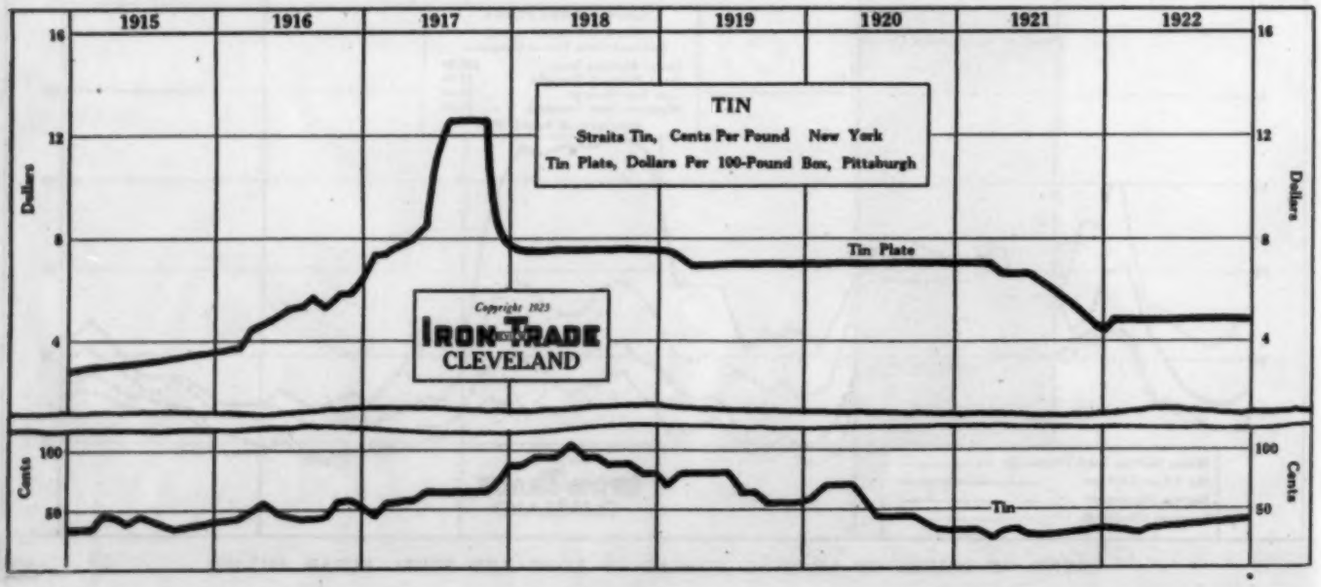
(*Concluded from Page* 98)

portionate supply of the world's tin, due to good tin plate and mixed metal business here, whereas European tin consumption was curtailed. Straits tin prices advanced from 32c in December, 1921, to a high of 38c in November, 1921, hovering close to this mark in December, 1922.

Increase in the duty on ingot aluminum, from 2 to 5 cents, as of Sept. 22, was an important development. Prior to the change, 98 to 99 per cent virgin ingot was quoted 19.00c by the domestic producer, which subsequently made three advances, totaling 5 cents a pound to 24.00c. The duty on sheets was advanced to 9.00c, which practically eliminated the foreign product.

The antimony was affected by a change in the duty from 10 per cent ad valorem to 2 cents a pound. Good buying done prior to Sept. 22 advanced the market from 5.00c to 7.00c, duty paid. Subsequently prices receded slightly.





Top Gear on One of Europe's Many Hand-Filled Blast Furnaces

European Market Reviews for 1922

Reports by Iron Trade Review
Staff Correspondents
Covering

Great Britain
France
Belgium
Luxemburg
Germany

Austria
Czecho-Slovakia
Hungary
Poland
Russia

also

Japan

European Iron and Steel Prices in 1922

British Prices in Pounds Sterling Per Gross Ton

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
SEMIFINISHED STEEL												
Billets, soft steel	7. 0.0	6.15.0	6.15.0	7. 5.0	7. 5.0	7. 2.6	7. 0.0	6.10.0	6. 5.0	6. 5.0	6. 5.0	6. 7.6
Sheet bars	7. 0.0	7. 0.0	6.15.0	6.17.6	7. 5.0	7. 2.6	7. 0.0	6.10.0	6. 5.0	6. 2.6	6. 5.0	6. 7.6
Wire rods	10. 0.0	9. 0.0	9. 0.0	9.10.0	9.10.0	9.10.0	9.10.0	9.10.0	9.10.0	9. 0.0	9. 0.0	9. 5.0
FINISHED STEEL												
Steel bars, England ½" to 3"	9.10.0	9. 0.0	8.15.0	9. 0.0	9. 5.0	9. 0.0	9. 0.0	8.15.0	8. 7.6	8. 7.6	8. 5.0	8. 5.0
Ship plates, England	10. 0.0	9. 0.0	9.10.0	9.10.0	9.10.0	9.10.0	8.17.6	8.10.0	8. 7.6	8. 7.6	8.10.0	8.10.0
Ship plates, Scotland	8.15.0	9. 0.0	9.10.0	9.10.0	9.10.0	9.10.0	9. 0.0	8.10.0	8. 7.6	8. 7.6	8. 5.0	8. 5.0
Beams, England	9.10.0	8.10.0	9.10.0	9.10.0	9.10.0	9.10.0	9. 0.0	8. 5.0	8. 5.0	8. 5.0	8. 5.0	8. 5.0
Beams, Scotland	9. 5.0	8.10.0	9.10.0	9.10.0	9.10.0	9.10.0	9. 0.0	8. 5.0	8. 0.0	8. 0.0	8. 0.0	8. 0.0
Sheets, black, 24 gage	11.10.0	11. 5.0	10.10.0	10.12.6	10.12.6	10.12.6	10.12.6	10.12.6	10.10.0	10. 5.0	10.15.0	10.17.6
Sheets, galvanized	16.15.0	15.10.0	15.15.0	16. 5.0	16. 5.0	15.15.0	15.12.6	16. 5.0	16.12.6	16. 5.0	17. 5.0	17.10.0
Rails, 60 pounds and over	8.10.0	7.10.0	8. 0.0	8. 0.0	8. 0.0	8. 0.0	8. 0.0	8. 0.0	8. 0.0	8. 0.0	8. 0.0	8. 0.0
Tinplate, base box, 108 pounds	0.19.0	0.18.6	0.18.6	0.19.6	0.19.6	0.19.6	0.19.6	0.19.6	0.19.3	0.19.0	0.19.9	0.19.9
Steel hoops	11.10.0	11. 0.0	11. 0.0	11. 0.0	11. 0.0	11. 0.0	10.10.0	10.10.0	10. 5.0	10. 5.0	10. 5.0	10. 5.0
PIG IRON												
Hematite, East Coast, mixed nos.	4.17.6	4.12.6	5. 0.0	4.17.6	4.15.0	4.16.0	4.12.6	4.10.0	4. 8.0	4.10.0	4.13.0	4.13.6
Hematite, West Coast, mixed nos.	5. 5.0	4.18.6	5. 2.6	4.18.6	4.18.6	4.18.6	4.18.6	4. 9.0	4. 9.0	4.10.0	4.13.0	4.13.6
Middlesbrough basic	5. 0.0	4.12.6	4.10.0	4.10.0	4. 5.0	4. 0.0	4. 0.0	4. 0.0	4. 0.0	4. 2.6	4. 0.0	4. 0.0
No. 3 Foundry, Middlesbrough	4.10.0	4.10.0	4.10.0	4.10.0	4.10.0	4.10.0	4.10.0	4. 7.6	4.10.0	4.12.6	4.12.6	4.12.6
No. 3 Foundry, Derby, Leicester and Nottingham	4. 5.0	4. 5.0	4. 5.0	4. 2.6	4. 2.6	4. 2.6	4. 2.6	4. 2.6	4. 2.6	4. 2.6	4. 2.6	4. 2.6
No. 3 Foundry, Northampton	4. 5.0	4. 0.0	4. 0.0	4. 0.0	4. 0.0	3.17.6	3.17.6	3.17.6	3.17.6	4. 0.0	4. 0.0	4. 0.0
No. 3 Foundry, Staffordshire	4.12.6	4. 5.0	4. 5.0	4. 5.0	4. 2.6	4. 2.6	4. 2.6	4. 2.6	4. 2.6	4. 2.6	4. 0.0	4. 0.0
No. 3 Foundry, Scotch	5.12.6	5. 2.6	4.17.6	4.12.6	4.12.6	4.12.6	4.12.6	4.15.0	4.17.6	5. 2.6	4.17.6	4.17.6
Ferromanganese, 76 to 80 per cent	15. 0.0	15. 0.0	15. 0.0	15. 0.0	15. 0.0	15. 0.0	15. 0.0	15. 0.0	15. 0.0	15. 0.0	15. 0.0	15. 0.0
COKE												
Furnace, Yorkshire	0.18.0	0.18.6	1. 1.0	0.19.0	0.19.0	0.19.0	0.19.0	1. 0.0	0.19.0	1. 2.0	1. 2.6	1. 2.6
Foundry, Yorkshire	1.10.0	1.10.0	1.10.0	1.10.0	1.10.0	1.10.0	1. 7.6	1. 7.6	1. 7.6	1. 7.6	1. 7.6	1. 7.6

German Prices in Marks Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
No. 3 Foundry	3350	3250	4136	6773	5800	6136	6136	7105	13567	26454	40106	1077 6
SEMIFINISHED STEEL												
Wire rods	5500	4400	4400	8050	8270	8770	8965	12000	20280	39530	82760	203300
Billets	5500	4250	5800	7800	8915	9415	9415	11600	19560	37940	79440	173700
FINISHED STEEL												
Bars	7200	5500	7500	10000	9810	10410	10410	17500	24050	46930	98270	23500 0
Ship plates	6500	6000	8100	10600	11000	11600	11930	18508	27000	52750	110540	26340 0
Medium plates	7800	7000	8100	11600	12140	12525	13570	19500	30680	59730	125050	29660 0
Black sheets	16000	8500	9875	12375	13200	13240	14450	22000	34620	65570	137270	329700
Tinplate	22000	19500	19500	26500	23000	28000	34000	42000	74500	102000	280000	542000
Plain wire	7000	6000	8700	11200	10265	10000	11470	14000	25900	50400	105520	181000
Bands and strips	9900	7300	9000	11500	10380	10970	11980	19000	27360	54430	113960	275100
COKE												
Ruhr furnace	591	683	878	878	1024	1308	1308	1784	2230	6018	7405	20487
Ruhr foundry	614	710	913	913	1059	1355	1355	1851	2315	6257	7702	20321

Belgian Prices in Francs Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
Basic bessemer, Belgian	240	240	235	230	220	205	195	205	215	225	235	250
Basic open-hearth, Belgian	240	255	245	240	240	225	210	215	220	230	240	260
Gray Forge, Belgian	225	255	240	235	220	215	195	200	210	225	235	235
No. 3 Foundry, Belgian	240	260	245	240	235	235	220	220	225	250	270	280
No. 3 Foundry, Luxemburg	230	255	245	245	240	230	220	215	230	250	265	265
No. 3 Foundry, Lorraine	245	260	255	245	240	235	215	215	230	245	265	265
SEMIFINISHED STEEL												
Blooms	365	....	330	....	....	....	....	310	320	325	325	350
Billets	365	....	330	....	....	....	....	335	345	345	345	370
Sheet bars	415	....	355	....	....	....	....	345	360	365	360	390
Wire rods	550	....	495	....	....	....	....	480	490	505	520	550
FINISHED STEEL												
Standard rails	485	525	410	400	400	400	400	400	410	425	445	500
Merchant bars	450	420	415	420	405	410	405	410	425	430	435	455
Normal beams and profiles	420	405	380	390	380	385	380	380	405	400	385	395
Plates, 5 millimeters and thicker	525	505	475	480	465	475	465	465	480	480	460	475
Sheets, black, 3 millimeters	530	570	500	500	490	505	520	505	515	525	510	520
Sheets, galvanized, 1 millimeter	1575	1500	1400	1350	1350	1225	1325	1325	1425	1450	1410	1425
Plain wire	700	700	700	630	615	600	610	610	610	645	645	665
Galvanized wire	850	850	830	800	800	775	785	785	785	890	890	910
Wire nails	550	515	505	460	445	445	445	445	480	505	505	525

French Prices in Francs Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
Hematite, Lorraine	400	400	350	345	335	315	315	315	295	290	310	310
Basic bessemer, Lorraine	225	235	250	250	230	225	210	205	215	225	240	245
No. 3 Foundry, Longwy, sand-cast	200	230	235	235	225	215	200	200	205	220	230	235
No. 3 Foundry, Longwy, chill-cast	215	245	245	250	230	225	210	205	215	225	240	245
Ferromanganese, 76 to 80 per cent	945	945	945	945	990	955	945	945	945	945	945	980
FINISHED STEEL												
Standard rails	500	550	550	550	550	550	550	550	550	550	550	550
Merchant bars	450	470	470	445	430	435	425	425	445	445	450	455
Angles	475	475	485	475	475	475	475	475	475	475	475	475
Normal beams and profiles	475	475	485	475	475	475	475	475	475	475	475	475
Plates ship and tank, 10 millimeters and thicker	660	660	650	630	590	590	590	590	590	610	610	610
Plates, bridge and tank, 5 to 10 millimeters	710	710	700	685	640	640	640	640	640	650	650	650
Sheets, black, 3 millimeters	800	820	805	785	720	720	720	720	720	690	690	690
Sheets, blue annealed, 2 millimeters	1050	1050	1010	950	900	900	900	900	900	730	730	730
Shafting, cold-drawn, 40 to 60 millimeters	800	825	825	850	850	850	850	850	850	850	825	800
Bars, 2 per cent nickel steel	1400	1100	1100	1100	1100	1100	1100	1100	1100	1100	1400	1450

Europe Now Doing More Business

Production and Exports Increased—More Men Now Employed—Heavy Tonnages of Pig Iron and Ore Shipped to America—Profits Still Lean—Exchange Chaos Hampers Business

BY H. COLE ESTEP
European Manager of Iron Trade Review

INDUSTRY in Europe made more real progress last year than in any preceding 12 months since the armistice, and in bringing about this improvement the European iron and steel industry was a powerful factor. The progress which Europe has made along the road to prosperity would be more evident if it were not for the financial chaos created by the reckless monetary policies of Germany and other countries east of the Rhine. To the confusion thus created, the Allies have added a chronic inability to agree on the reparations question, which is still a plague to business in the Old World. The result has been wider fluctuations in European currencies.

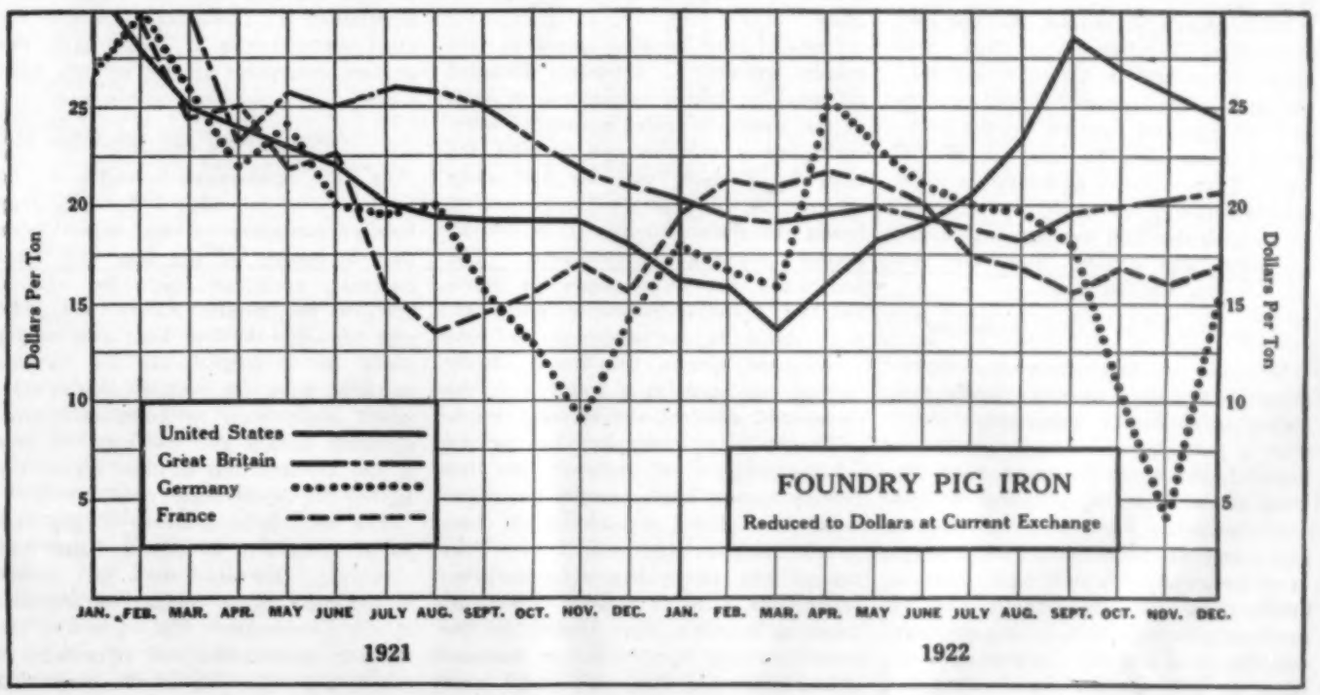
In view of the financial obstacles with which it is confronted, it is remarkable that European industry continues, as it does, to make steady, if slow progress toward greater production and trade. This is due to the stabilizing influence of Great Britain, the former neutral countries, and, to a lesser degree, France and Belgium. Entering the fifth year of peace, Europe can thank her politicians for most of her troubles and her business men for the fact that she is able to keep on feeding her people and making some progress.

In January, 1922, the combined pig iron production of Great Britain, France, Belgium, Luxemburg, and Germany was about 1,300,000 gross tons; in December it had climbed up to 1,900,000 tons. The combined exports of these five countries advanced from 701,000 tons in January, 1922, to about 890,000 tons in December. The increase on the year was 30 per cent, and at present the iron and steel export trade of Europe is over 80 per cent of its prewar volume. The increase in European pig iron production between January and December last year was almost 50 per cent, but the output is still only two-thirds, of normal.

Europe's foreign trade is further advanced than its production. This is because financial and political disturbances are hampering internal development. A large share of Europe's increased business is with the outside world; this activity is aided by the low cost of production in the old countries, which enables them to undersell producers in the United States and other newer lands. This condition is not abnormal.

In the iron and steel field, the United States has contributed during the past few months in no small measure to Europe's growing export trade. America in 1922 imported no less than 250,000 tons of British and continental pig iron and ferromanganese, a heavy tonnage of semifinished steel, and several hundred thousand tons of iron ore. The reason for this is clearly delineated in the chart on this page.

For six months the American market for our cheapest iron has been well above all others. This chart illustrates the great fluctuations in continental prices on account of the collapse of the mark. The constant tendency of world iron and steel prices to reach an equilibrium, in spite of the gyrations of foreign exchange, is also clearly depicted.



TWO YEARS OF WORLD PIG IRON PRICES

This Chart Shows Southern No. 2 Foundry at Birmingham; French Lorraine No. 3 Foundry; German No. 3 Foundry at Oberhausen; and British No. 3 Foundry at Middlesbrough, Reduced to Dollars at Current Exchange

Britain Leads in Foreign Trade

Liquidation of Prices and Costs Enables United Kingdom To Capture the Lion's Share of the World's Export Trade—America a Heavy Buyer —Home Market Improvement Expected

BY JOSEPH HORTON

British Correspondent of Iron Trade Review

THE outstanding feature of the British iron and steel trade during 1922 was the stabilizing of prices. As compared with the previous year which was a period of debacle, the steadiness of selling prices has been very noticeable throughout the year. A glance at the table summarizing the weekly figures shows how remarkably steady have been the quotations for nearly all classes of material. In some departments, such as galvanized sheets, an upward movement has commenced which is not unlikely to continue.

In spite of discouragements the year has been one of progress. The position in regard to pig iron a year ago was especially discouraging, the December total of operating blast furnaces being 77 out of a total available of 487. This figure represented a reduction in the month of 12 in the furnaces at work. The total number of furnaces working in October, 1922, was 151, almost exactly twice the total of the previous December. In the same period, the Scotch total of operating furnaces has increased from 9 to 32.

With regard to output, the pig iron production in December, 1921, was 275,000 tons and in October last 481,500 tons. The output of steel ingots and castings has grown in the same period from 381,000 tons to 565,200 tons. There is still, of course, a good deal of leeway to make up as compared with the 1913 average, which, for pig iron, was 855,000 tons, and for steel ingots 638,600 tons.

Production Costs Trend Downward

In costs of production the movement has been steadily downward, wages, in particular, being much lower than a year ago. In many instances, the reductions of this year have totaled from 30 to 40 per cent of the war addition. Fuel, too, is cheaper, and some alterations have taken place in railway rates, which have given a little relief, although this is one of the heads under which strong pressure will be exercised for further concessions in addition to the further reductions announced Dec. 1.

Comparison of percentages of unemployment appears to reflect quite faithfully the measure of improvement. A year ago the percentage of workpeople unemployed in the iron, steel, tin plate and galvanized sheet trades was 32.3. The improvement is not equivalent in engineering and iron foundries, unemployment having fallen from 26.5 to 21.9 per cent in these industries. In shipbuilding the proportion a year ago was 34.6 per cent and is now 36.3 per cent. This represents retrogression, but still worse figures have been recorded in the meantime. The low state of employment both in shipbuilding and engineering are the really sinister factors in the situation, sufficient in themselves to offer a warning against undue optimism, and indicating clearly enough that the return to a healthy and vigorous condition must necessarily be slow and laborious. A good deal more has been heard of late of shipbuilding orders, encouraging the hope that some improvement in the employment figures may soon be reported, and the almost immediate effect would be a corresponding increase in activity in the iron and steel trade.

One of the healthy signs is the steady growth of exports. Detailed reference is hardly necessary, in view of the complete tables presented herewith, but it will be noticed that the total for October was far and away the best of the year, and under several heads the finished material sent away shows marked improvement. The somewhat heavy tonnages of semi-finished material imported fairly reflect the collapsed state of the continental exchanges, the franc latterly having emulated, in a small way, the downward rush of the German mark.

The Belgian steelmaker has missed no opportunity of rushing into the British market whenever the low franc value has placed an additional competitive weapon at his disposal. This competition alone has reduced price cutting to a point making profit almost an impossibility. Under the extremely trying conditions of business it is remarkable that while there have been numerous instances of heavy loss incurred, sometimes on an enormous scale, as for example, that of the Ebbw Vale company with a deficit of £320,000, serious cases of bankruptcy have been conspicuously absent, and the general impression is that the trade generally will be able to fight its way through to financial vigor at no very distant period.

It is remarkable that the export business has led the way in the direction of general revival. The usual home customers hardly have been in evidence. Shipbuilders have called for very little material. The building trade has been bad; house building has been generally unprofitable. The engineering trade has not yet fully recovered from the prolonged lockout in the spring and is still languid. The customary buying by the railways has been influenced by the tightness of finance and a desire to syndicate the principal lines, with a view to restricting competition, and making better use of rolling stock. It is commonly estimated that two-thirds of the galvanized sheets and tin plate made in this country are sold abroad, and in view of the comparative activity of foreign buying, the persistent lead maintained by these trades in the revival seems to be in accord with the greater enterprise of the foreign consumer.

Modern Plants Get Business

In this connection it seems to be more than a coincidence that the large foreign contracts which have been such a feature of the iron and steel business, such as rails for India, bridges for South Africa, extensive pipe lines for the Far East and rolling stock on a large scale for various markets have, in nearly every case, found their way to companies conspicuous during the last year or two in the construction of new plants designed for large scale production.

The very large increase in the output of coal, both in bulk and per man employed, has also been of service in placing cheaper fuel at the disposal of the steelmaker. Unfortunately, the smelter cannot take full advantage of the reduction, owing to the very high railway rates, of which complaint is frequently made. Under this head the

concessions made by the transportation companies have been notoriously inadequate, and, in addition, the manufacturer has to face enormous burdens of taxation, which in many instances are quite sufficient in themselves to put him out of the running when competing in the international market.

The statement of Sir Frederick Mills at the annual meeting of Ebbw Vale company embodied a typical example of the burdens now carried by large companies. He pointed out that as compared with prewar conditions the half the additional price. Similarly, if iron is delivered from the midlands to London, it costs exactly £1 per ton, a figure representing practically one-third of the total additional price now secured by the sale of the material. All these transport charges compare very unfavorably with continental rates, and, in many instances, are sufficient in themselves to give the continental maker a commanding position.

The British blast furnace owners fully recognize the help derived from America through the big sales of pig may ensue in the way of American business.

In the finished steel department, the really noteworthy feature of the year's trade has been the big buying by Eastern markets. In March India took 25,000 tons of finished steel from Middlesbrough, and in October the tonnage to the same destination from that port was 11,144. Every month, without exception in 1922, India took large quantities of English steel, and the country hopes to get its full share of the steel required for the 30,000 miles of railway projected in India, together

A Year of Advancing British Foreign Trade

Exports in Gross Tons for 1922

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.
Scrap	7,765	4,754	15,834	16,009	28,544	12,791	14,764	11,971	10,176	7,467
Pig iron and ferroalloys	30,450	43,272	44,467	42,980	57,269	56,005	50,733	46,250	87,701	129,959
Blooms, billets, slabs, other than of special steel	415	318	602	796	642	406	1,150	364	356	730
Bars	17,555	12,856	27,941	17,235	18,024	17,820	22,949	20,235	20,696	25,657
Beams, etc	4,292	3,737	5,983	4,152	6,038	3,143	4,546	4,585	3,419	3,857
Hoops and strips	4,377	2,724	3,348	1,681	390	4,124	3,711	4,834	4,702	4,780
Plates and sheets not under ⅛ inch thick	4,851	6,624	5,815	8,036	4,905	3,745	6,238	6,273	6,402	6,531
Sheets under ⅛ inch thick, other than black plates	6,803	10,686	16,399	13,668	15,355	15,180	13,356	13,855	13,870	14,181
Galvanized sheets	55,560	37,795	49,945	40,454	46,258	35,432	37,739	47,404	35,041	39,487
Tin plate	34,275	34,802	38,847	36,055	39,455	37,134	40,809	36,817	35,258	35,125
Cast iron pipe	3,491	5,497	4,362	3,940	4,817	5,684	6,398	8,093	5,815	11,065
Steel pipe	4,645	5,585	6,610	5,157	4,954	7,224	5,629	8,395	7,550	7,680
Steel rails, new	36,191	18,447	41,157	28,528	14,365	11,493	8,529	22,370	16,469	17,268
Wire	3,244	2,40/	2,688	3,226	3,356	3,625	5,966	5,893	5,390	5,076
Wire products	1,756	2,029	2,039	2,353	2,349	2,651	2,396	3,817	3,574	3,789
Manufactures of cast iron	975	1,004	1,836	920	1,233	1,040	859	1,146	1,074	1,252
Anchors, grapnels, chains, etc	1,183	718	913	860	821	807	903	955	1,125	853
Hollow-ware	678	665	727	690	860	745	983	1,215	1,004	1,112
Miscellaneous iron and steel	14,053	12,846	15,820	11,320	11,621	10,185	10,836	12,002	10,760	11,440
Total, including items not specified above	261,119	228,370	311,654	274,422	300,981	249,089	266,507	281,954	289,344	354,595

Imports in Gross Tons for 1922

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.
Pig iron:										
Forge and foundry	11,277	4,143	2,525	2,075	1,529	2,909	2,844	4,444	5,904	6,260
Acid	....	....	....	....	....	....	....	155	....	....
Basic	20,069	12,802	6,156	5,344	3,329	1,173	3,894	10,086	5,761	10,144
Ferroalloys	393	151	1,091	738	1,251	797	933	797	689	1,480
Scrap	11,451	12,661	6,319	12,211	11,488	6,059	8,187	3,890	12,633	9,614
Blooms, billets, slabs:										
Iron	7	50	....	102	1,728	1,327	650	2,934	2,187	1,020
Steel	10,395	7,901	12,035	9,818	11,198	6,202	12,186	15,332	14,946	25,408
Bars, rods, angles, shapes, etc:										
Iron	7,102	6,278	5,942	5,667	3,469	3,462	3,597	5,972	5,809	9,659
Steel	7,325	6,727	2,945	5,579	7,898	6,473	1,473	2,908	4,823	6,124
Wire rods, steel	3,227	3,017	3,608	2,754	4,585	2,982	4,614	7,849	4,533	3,679
Other steel	2,747	3,523	3,873	2,438	3,471	1,974	2,793	3,768	2,231	2,402
Castings, iron	634	250	337	141	383	207	132	102	89	50
Castings, steel	309	403	445	286	354	122	209	138	229	269
Steel girders, beams, etc	2,176	2,140	1,531	2,295	2,345	2,713	2,062	5,473	4,428	4,210
Hoops and strips	390	829	2,272	2,037	2,102	3,665	2,441	2,911	811	847
Plates and sheets	3,292	2,223	3,336	1,697	2,292	4,324	3,388	1,616	4,479	3,599
Cast tubes, pipes and fittings	1,386	1,244	1,056	1,761	1,407	1,465	1,999	1,964	1,902	1,918
Wrought tubes, pipes and fittings	2,430	1,527	2,270	1,992	2,235	1,864	1,417	2,023	1,023	1,529
Rails for street cars	348	25	12	1,044	249	861	20	155	53	—
Railway rails	1,224	1,229	1,157	866	222	1,274	2,309	1,560	543	38
Wire	3,058	2,223	4,144	3,839	3,419	2,383	2,605	2,941	2,460	2,907
Total, including items not specified above	100,178	77,270	70,161	72,074	72,427	58,856	64,080	84,003	83,186	100,252

direct railway charges on a ton of finished steel had increased by no less than 15 shillings ($3.40) while local rates, which 10 years ago amounted to 7½ pence per ton on finished steel were during the last twelve months no less than 7s 6d.

Railway rates press still more heavily on the midlands and Cyril E. Lloyd, chairman of N. Hingley & Sons, Ltd., Dudley, has already pointed out that while the selling value of pig iron at the furnace is not more than £1 5s to £1 10s above the prewar price, the delivery of material for the manufacture of that iron costs 11 shillings per ton more, thus absorbing nearly iron, in themselves accountable for the restarting of a number of blast furnaces. One West Country firm alone recently booked an order for 30,000 tons of pig iron, and the heavy sales to America in August and September made the October statistics of Middlesbrough shipments the best for six years, America alone taking over 28,000 tons. There is a slight lull in American buying just now, but some big orders have yet to be executed, and the general view is that this business will continue well into the new year. There are signs that the gradual increase in the home demand will compensate for any possible losses which with business arising from the 40,000 miles contemplated for the South American republics and the big quantities called for in connection with South African, Australian and other colonial extensions.

The home railways have now completed their amalgamation schemes and are placing orders on an increasing scale for rolling stock, rails and railway material. It is fully expected that the records for early 1923 will show an increase in the number of blast furnaces operating, especially in Scotland. Political circumstances favor revival, probably at an accelerated pace. A conservative government usually coin-

cides with greater business confidence, the commercial and landowning classes regarding that party as the natural custodians of their interests.

It is not without significance that within three weeks of the election of the new government Bonar Law has approached the railway managers with a suggestion that they should expedite the various schemes of re-equipment and extension already sanctioned involving an outlay of £60,000,000 at least. The official report is to the effect that the prime minister's proposals are being favorably received.

With regard to the prospects for the new year, forecasting is much less risky than it was a year ago, when prices were on the slippery slide. It is difficult to see how there can be further reductions of a material amount. At the same time continental competition, though quiescent for the present, will be vigorous enough, in combination with the large amount of British capacity still unemployed, to check any runaway tendencies in prices. It seems likely that the present selling figures will continue for some time, even with a moderate improvement in trade.

The reports from the shipbuilding areas are much more encouraging. The recent reductions in wages, combined with drastic internal economies, have enabled the shipbuilders just to meet the requirements of owners in the charges imposed. A lot of the Clyde shipyards have lately gone on full time, and many workpeople and apprentices have been re-engaged. In view of the enormous number of old ships still in commission, though in many respects obsolete, it is believed that shipbuilding will tend to increase in the early months of the new year.

A similar increase of activity is observed in Sheffield, while builders of electrical apparatus in many cases are getting busier. The contracts now open include large requirements, especially on corporation account in the way of gas and water pipe together with a good deal of engineering equipment. In other directions, the signs are decidedly hopeful, while the feeling of confidence is stronger than at any time since the war. The general impression is that the time has arrived for a forward movement, and that 1923, though it will not be a boom year, will register considerable progress toward prosperity—doubtless with finely-cut prices, but with much more general activity than has been experienced for the last two years.

Belgium Gets Under Way Once More

By a Staff Correspondent

AFTER a long period of depression the Belgian iron and steel industry began to show signs of improvement in October, 1921. The gains made during the last quarter of 1921 were maintained throughout the first half of 1922. During the first quarter of 1922 the number of active blast furnaces increased from 17 to 22. Production of pig iron during the first six months of 1922 amounted to 651,950 metric tons as compared with 564,610 tons during the corresponding period of 1921. There still remains a large gap between present and prewar production figures, as statistics show that 1,242,348 tons of pig iron were produced by Belgian furnaces during the first six months of 1913. The Belgian domestic demand has been comparatively quiet during the past year. Belgian rolling mills, however, absorbed the entire domestic production of semi-finished products, and 70,000 tons were imported during the first six months of 1922, most of which came from Luxemburg and Lorraine.

Belgian exporters encountered keen competition in foreign markets, but succeeded in obtaining many large orders, particularly for rails. Among the large rail orders secured by Belgian mills during 1922 for export were the following: For Finland, 15,000 tons; for Argentine, 56,000 tons; for Bulgaria, 5800 tons; for Japan, 5000 tons; for Holland, 21,000 tons; and for Brazil, 12,500 tons.

Strenuous efforts to reduce production costs were made by Belgian steelmakers during the period under review. A wage reduction of 10 per cent was to have been made in May to be followed by another cut of like amount in June. This announcment resulted in a general strike and a solution to the problem was proposed by the minister of industry and labor, following which the total reduc- than was limited to 8 per cent, in instalments. Hourly pay of workers in the iron steel industry in the Liege region at present is about as follows:

	Francs	Cents
Blast furnaces	2.07	16
Rolling mills	3.00	23
Machinists	1.85	14
Common labor	1.75	13

Coke production was increased during the first half of the year, as receipts from Germany continued to fall off. The monthly output during the first half averaged 194,935 tons which shows considerable improvement over 1921 figures (145,895 tons) but represents only 66 per cent of average monthly output.

Luxemburg Customs Union

Early in 1922 negotiations between Belgium and Luxemburg were opened with a view to suppressing the tariff wall and establishing free trade. A new treaty was drawn up and after being duly ratified by the respective governments became effective on May. 1. This combination possesses advantages for both countries, as Luxemburg now finds a ready outlet for her production of semifinished steel in Belgium, where it is rerolled or fabricated before continuing on its way to world markets. Thus Belgium which has always been obliged to import large quantities of semifinished steel products has not only assured herself of a dependable source of supply, but this movement of Luxemburg's products through Belgium greatly increases the freight receipts of railroad companies. In all probability France and Belgium will eventually modify the treaty under which they are now trading.

From February to July the trend of prices was downward on all classes of Belgian iron and steel products. Early in August however they began to swing the other way and the close of the year found most products quoted at practically the same prices as on Jan. 1, 1922.

Belgian iron and steel makers are preparing to make a place for themselves in the world's markets. Practically all the plants which were damaged have been reconstructed and nearly all will have greater capacity than in prewar days due to modern machinery and improved methods. It is believed that the revival of business and the upward trend of prices in the United States due to wage advances and increased fuel costs will facilitate Belgium's task of selling her iron and steel products in foreign markets. It is not probable that American competition in export markets will be as keen as it was in 1920 and 1921 when business was taken at prices often below cost in order to keep the mills operating. Nor do Belgians expect to encounter serious competition from Germany for some time to come. Several of Germany's largest industrial groups have entered into contracts with the various co-operative societies in the French devastated regions, under the terms of which they will deliver to France enormous quantities of materials for reconstruction. If the Germans carry out the... engagements, much of the surplus which they normally export must be diverted to France.

French Gain at Home and Abroad

Production and Exports Both Are Increasing—Fuel Shortage Prevents Greater Activity with German Coke Deliveries Short—Many Sales Syndicates Again Functioning—Profits Remain Meager

BY VINCENT DELPORT
French Correspondent of Iron Trade Review

AN EXAMINATION of the statistics of the French iron and steel industry for the year 1922 discloses the fact that the situation is gradually improving. The production of metallurgical products and the domestic consumption as well as exports show a considerable increase over 1921. The results obtained would undoubtedly have been much more gratifying had deliveries of reparations coke from the Ruhr been sufficient to meet the requirements of blast furnace operators in the East and Lorraine. Unfortunately, however, the Germans failed to comply with the program laid down by the reparations commission with the result that producers could not increase their output in the face of a growing demand.

Fear the Clutch of Stinnes

The Lubersac-Stinnes agreement, under which Germany agrees to deliver large quantities of reconstruction materials to France on the reparations account, was bitterly opposed by French industry which fears that such contracts will give Germany a good opportunity to penetrate the French market.

Last year's progress is worthy of comment as it has been accomplished against great odds. The political and financial situation of France is such that business is influenced by political disturbances. During the year France participated in several conferences of international character. The issue of these several conventions was of vital importance to French industry as they all bore upon such subjects as reparations, finance and disarmament. Thus a general slowing down in business occurred whenever conferences were announced, and the lull prevailed during the entire period of negotiations. Moreover constant fluctuations in French exchange necessitated frequent adjustments in prices. It is true that the present low value of the franc has stimulated export business but this advantage is offset by the increased cost of raw materials purchased abroad. The margin between production costs and selling price has been so small that many concerns have had to operate at a loss. The large firms which extended their plants during the war are now finding it difficult to adjust to postwar conditions. In glancing over the annual reports of several of the most important interests one notes that very few disclose even a reasonable profit, whereas others have suffered heavy losses. However, many companies have increased their capital, and plants in the devastated regions have nearly completed their reconstruction work.

During 1922 foreign competition in the French domestic market was keenly felt on certain products, particularly English hematite pig iron and sheets, Belgian sheets and bars, and German manufactured goods. However, toward the close of the year, English competition had practically dropped out, on account of the high rate of exchange, and German competition was also considerably reduced, owing to high tariffs. Normally, France should be self-sufficient in so far as iron and steel products are concerned, and even produce a large tonnage for export. The reorganization of the different selling syndicates, such as the Comptoir Siderurgique, Comptoir de Longwy, etc., is closely related to the development of export business. At present the Comptoir Siderurgique controls the sale of semifinished steel and rails in the domestic market. The Comptoir des Poutrelles (structural shapes) and Comptoir des Toles et Larges Plats (plates and sheets) are also functioning, but none of these handles export business. The Comptoir de Longwy (foundry pig iron) and Comptoir des Hematites have been dissolved. It is expected, however, that they will be reorganized in 1923.

A large iron and steel exporting agency was incorporated early in 1922 under the name of Longovica. This company may be compared to what was the Consolidated Steel Corp. as it combines the export business of several French manufacturers, the most important of which is the Acieries de Longwy.

Export Business Grows

France exported 1,771,351 metric tons of iron and steel and certain engineering products during the first eight months of 1922 valued at 603,042,000 francs, as compared to 1,257,688 tons and 474,534,000 francs for the first eight months of 1921. Exports of semifinished products and wire rods, and also plates, sheets and rails were considerably heavier than during the preceding year. Sales in foreign markets were increasing steadily as the year drew to a close and the outlook is encouraging for 1923. French iron and steel makers are seeking an outlet for their products in foreign markets and are bending every effort to build up a permanent foreign trade. Until now they have succeeded in making their presence felt in neighboring markets only. The coal situation is causing some anxiety to iron and steel producers.

French Finished Steel Production

Metric Tons for First Half of 1922

Material	District							
	East	Alsace Lorraine	North	Center	South-west	South-east	West	Total
Structural shapes	50,262	98,723	18,565	9,775	1,211	283	11,204	190,023
Rails	83,402	81,152	3,400	1,155	7,443	12,111	7,015	195,678
Plates and sheets	43,804	49,866	30,465	57,930	1,038	....	21,627	204,730
Bars	107,733	233,962	60,868	69,220	15,614	13,483	27,780	528,660
Hoops and bands	9,764	5,302	5,955	2,664	1,269	....	....	24,955
Tires	3,950	....	6,996	5,139	413	....	....	16,498
Springs	....	....	....	2,976	1,124	1,201	....	5,301
Ties and track fastenings	8,028	12,453	500	717	366	996	....	23,060
Wire rods	64,943	24,468	....	3,551	....	....	....	92,962
Wire products	14,177	20,402	22,174	3,133	....	....	....	59,886
Pipe	736	....	20,484	2,682	882	1,920	....	26,704
Castings	2,516	2,837	17,683	10,060	320	1,120	1,413	35,949
Forgings	4,402	....	3,018	10,554	1,013	450	....	19,437
Tin plate	....	1,322	....	1,404	....	....	10,106	12,832
Sundries	....	677	588	5,477	48	221	....	7,011
Total	393,717	531,164	190,697	186,437	30,741	31,785	79,145	1,443,686

As the year 1922 drew to its end, French coal mines advanced their prices and it would appear that they are taking advantage of the absence of English competition caused by high exchange rates. Belgian coal has also gone up due to recent wage increases. This situation combined with the coke shortage has already resulted in the blowing out of several furnaces and the outlook for 1923 is anything but encouraging.

The inability of French iron and steel makers to obtain regular and sufficient supplies of coke is one of the most difficult problems they have to contended with. France depends on Germany and Belgium for her coke and her imports during the first nine months of 1922 amounted to nearly 4,000,000 tons. French coking plants produced only about 1,000,000 tons annually. During October, the shortage was so acute that 20,000 tons had to be ordered from England, at a price which would ordinarily be considered prohibitive due to the high value of the pound as compared with the franc. However, it is anticipated that early this year production of French coke ovens will be increased by 25,000 tons a month.

The price of furnace coke which is officially controlled, was fixed at 65 francs ($5.50) per metric ton beginning 1922 and rose to 97 francs ($8.73) in July and August, falling back to 95 francs ($6.20) in September, where it remained.

Ore Output Satisfactory

Iron ore production has been satisfactory. During the first nine months of 1922 the extraction of iron ore amounted to over 14,000,000 tons or practically as much as was mined during the entire year 1921. The mines in the Metz-Thionville and the Briey-Longwy basin produce about 95 per cent of all iron ore mined in France. During the first eight months of 1922 France imported 270,937 tons of ore as compared with 266,955 tons during the corresponding period of 1921. In the year to and including Aug. 31, France exported 5,590,769 tons of iron ore as against 3,361,242 during the first eight months of 1921. Germany alone purchased 1,411,031 tons of French ore during this period as against 662,381 tons for the same period of the preceding year. The 32 per cent Minette ore in the Lorraine district is quoted 11.50 francs ($0.74) a ton, practically constant through 1922.

During the first nine months of 1922, French blast furnaces produced 3,600,316 metric tons of pig iron whereas the total production of 1921 was only 3,598,315 tons. There were 103 furnaces blowing on Oct. 1; 59 idle and 59 in course of construction or being repaired. On Jan. 1, only 73 stacks were in blast. During November, a few furnaces were banked, owing to coke shortage. The demand for pig iron, foundry pig especially, is growing in sufficient quantities. On July 1, 89.1 per cent of pig iron production was phosphoric iron suitable for the basic bessemer process; 8.4 per cent, hematite; and 2.5 per cent, ferroalloys. Lorraine and the eastern districts continue to be by far the largest producers of foundry pig (between 80 and 85 per cent) and the furnaces in that region practically control the price. Foundry No. 3, chill-cast, rose from 215 francs ($18.30 at current exchange) per metric ton during January to 255 francs ($22.95) in April, falling back to 205 francs ($16.40) in August and rising again to 250 francs ($16.25) at the end of the year. Hematite pig is produced almost exclusively in the north, central and western regions of France. The prices of 400 francs ($36) and later 360 francs ($32.40) quoted by the Comptoir des Hematites, which was dissolved Aug. 31, were purely nominal, and during the first eight months, English competition was such that prices were entirely controlled by British quotations. Actual prices ranged between 290 francs ($18.85) to 330 francs ($21.45) according to origin.

During 1921 the total production of steel ingots and castings amounted to over 3,100,000 metric tons. During the first nine months of 1922, production reached 3,216,349 tons.

On July 1, 1922, French steel plants operating were as follows, the corresponding figures for Jan. 1, 1922, being shown in parentheses: Acid bessemer, 35 converters (40); basic bessemer, 59 converters (54); open-hearth, 75 furnaces (90); crucible, 22 furnaces (13); electric, 17 furnaces (13). The average number of men employed in the steel industry during the first six months of 1922 was 68,000 as compared to 71,000 for 1921. The average monthly production was 350,000 tons or about 59 per cent of prewar.

Imports of semifinished steel for the first eight months of 1922 amounted to 184,201 tons as against 112,723 tons for the same period of 1921. Export figures were 503,066 tons and 355,937 tons, respectively, showing a considerable increase.

The production of finished products for the first six months of 1922 amounted to 1,443,686 metric tons corresponding to a monthly average of 240,614 tons, as compared with an average monthly production during 1921 of 182,393 tons. Production has been increasing steadily and reached the highest point at the beginning of the last quarter.

Bar mills were busy during the entire year. The demand for structural shapes became very brisk early in the third quarter. Plates were difficult to sell due to prolonged idleness in the shipyards. Sheetmakers found it difficult to compete with English and Belgian mills. Reconstruction work in the devastated regions will absorb large quantities of shapes as soon as building activities are resumed next spring. The various railway companies are also expected to come into the market early in 1923 for rails and accessories.

What the Plants Are Doing

A brief resume of conditions actually existing at the plants of several of the largest French companies is of interest in connection with this review. At the Societé Normande de Métallurgie, two furnaces and the steel plants are now being operated. It will be remembered that this company is in liquidation. At Micheville, reconstruction work is not yet completed. Three stacks producing 650 tons daily are active out of a total of six. The steel plant was re-opened on May 27, but the American rolling mills which are being installed will not be ready for operation before next spring. The Acieries de la Marine et d' Homécourt which is affiliated with Micheville have not yet rebuilt the plants at Homécourt and Hautmont. These plants formerly represented over 50 per cent of the total output of the company.

Pipe production has been unsatisfactory. However, the Comptoir des Tubes Soudes par rapprochement (butt-welded tubes) has been organized and it is expected that this association eventually will control the sale of lap-welded and seamless tubes.

France's international trade in general has augmented, but her total imports for the year 1922 were considerably in excess of her exports. during the first 10 months of 1922, 41,860,494 tons of merchandise was imported with an estimated value of over 18,500,000,000 francs as against 30,967,796 tons and 17,730,000,000 francs during the corresponding period of 1921. Exports figures are respectively, 18,152,002 tons and 16,156,545,000 francs, as against 13,096,621 tons and 16,436,343,000 francs, showing that the excess of imports over exports has increased. The balance of trade will probably be more in France's favor during 1923 for customs tariffs have been increased and commercial treaties have been entered into with Spain, Poland, Czecho-Slovakia, Italy and Canada.

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Germans Wonder About Future

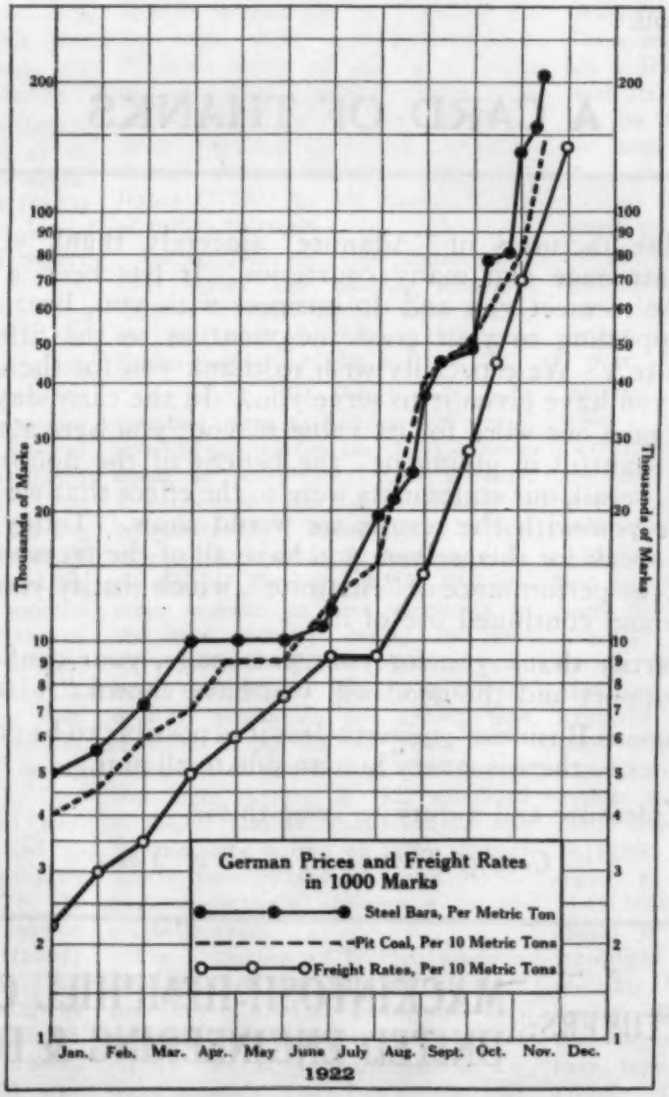
Iron and Steel Industry, Becoming Less Self-Contained, Finds Difficulty in Securing Sufficient Foreign Credits for Imports of Raw Materials—Production Increased Despite Difficulties—Fantastic Price Advances

By a High Official of the German Iron and Steel Industry

THE European economic crisis continues. Even though the year 1922 has seen certain improvement in some countries, it has not brought any solution of the burning economic questions of the day. When the year 1922 commenced, the dollar stood at 200 marks, in Germany. While these lines are being written, more than 9000 marks were being paid for it. In keeping with the exchange rates, prices at home soared up to giddy heights. Forty to fifty-fold price rises had to be faced within a few months. This gigantic revaluation process gave the German iron market quite a singular aspect. It acted as a stimulant at first, but subsequently as a clog on business. It was quite in vain that the iron and steel industry endeavored to stem the tide of inflation by adhering to fixed price policies. The "Deutsche Stahlbund" tried for four and six weeks to manage with its old prices and repeatedly took upon the pockets of its members the freight and wage increases. The engineering trade went even as far as to conclude long term agreements at fixed prices. All efforts, however, to counteract the inflation at home and to create a basis for safe calculation covering an extensive period were bound to come to nought as long as there existed no firm ground for a stabilization of the mark abroad. About 77 per cent of all German pig iron is derived from foreign ores. Every shock in the fluctuations of the exchange rates last year reacted with full force on the German iron prices, and it is estimated that every rise of the Dutch guilder by one point means an increase in pig iron prices by 33 marks. When the plunge of the mark commenced in dead earnest, about the middle of the year after the collapse of the Genoa conference, and the dollar rose from 1000 marks to 2000 marks and finally to 9000 marks within a few weeks, the cost of living, wages, freights, coal, and iron prices followed the exchange rates with uncanny speed.

Indeed hardly would a month pass by without a forty, fifty or even one hundred per cent freight increase. The index figure for cost of living began to assume the speed of an avalanche and rose during the third quarter of the year by 1500 points. Workmen and employes soon adjusted their claims automatically to the cost of living index figure and demanded not only from month to month, but every fortnight an adaptation of wages and salary to the general price inflation. The coal price jumped up rapidly from month to month and October saw a twelve-fold price increase over that of January. The accompanying chart gives plain evidence of the gigantic rises of freights, coal, and iron prices during 1922.

Hence the basis for the price movement of iron and steel was in a constant flux. Numerous establishments and dealers have sustained great losses and lived for a long time upon their capital before they learned to calculate in gold and to adust their prices in a manner which secured replenishment of their stocks. As early as August the "Stahlbund" was compelled to overhaul all its prices every eight to 10 days and to adapt them to the general price inflation. It had previously readjusted its terms of delivery and payment and recommended to fix prices for the day of delivery. Negotiations are being carried on at the moment among producers of finished steel, which have for their special obect a curtailment of the time of payment. This is particularly necessary because the enormous price inflation has created an insatiable demand for money which can not be met by the note presses, with the result that a great shortage of money exists all along the line. The dearth of money was aggravated by the circumstance that the banks and contractors declined granting any credits. Many small dealers have not survived this crisis and have had to pay for it with their independence; but even for financially strong works the money and credit strin-



HOW INFLATION AFFECTED GERMAN PRICES AND FREIGHTS

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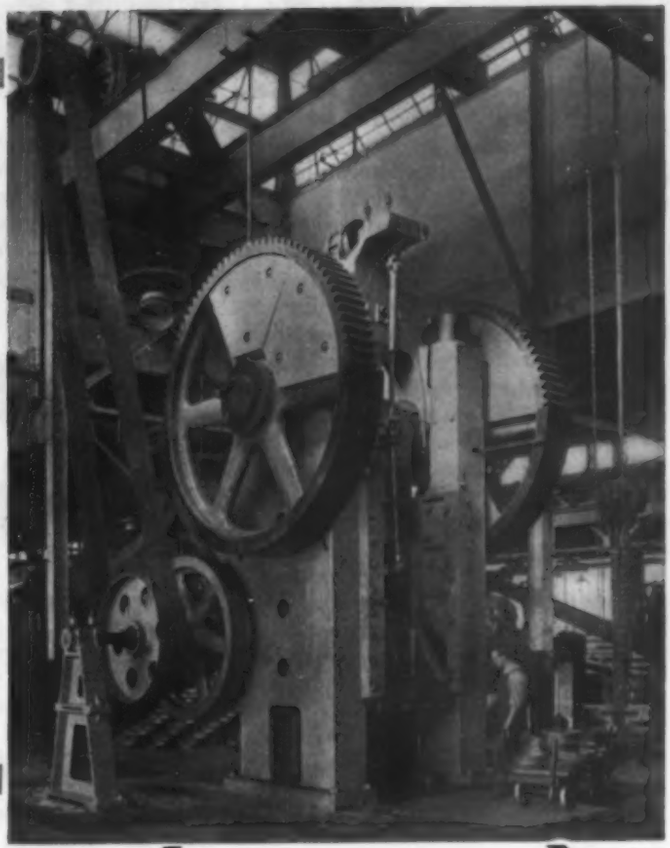

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gency proved one of the gravest concerns of the whole year.

Owing to the ceaseless price inflation from month to month, the iron market naturally experienced stimulation, to which it must be added that brisk business commenced in the building trade in the spring of the year throughout the whole of Germany. Orders were given for hundreds of thousands of dwellings. Numerous factories resumed repairing, extending, and modernizing their works, which they were compelled to suspend during or after the war. Others erected new plants as substitutes for the losses incurred at Lorraine, Luxembourg, and Upper Silesia. The "flight from the mark" began to take a firm hold of everybody. Whoever had any money to spare, invested it in real values. Although home business slackened temporarily in the beginning of the summer, by August a most violent demand set in, until in the autumn the enormous price inflation as well as the money and credit stringency forced the desire to buy into narrow limits. Nearly all the large industrial reconstruction programs were suspended toward the end of autumn and a large number of orders for boiler plants, engineering installations, structures, etc., were cancelled.

Fuel Limits Output

The extraordinary boom could be utilized only partly, as nearly all industrial establishments suffered throughout the year from fuel shortage and were thus compelled to curtail production. The coal shortage was due in the first place to the compulsory deliveries to France and Belgium, for which an increase of from 1,600,000 tons to 1,900,000 tons monthly was demanded. It was quite in vain that the German government repeatedly applied for a reduction, especially with regard to the deliveries of coke, and that it undertook to deliver in its place larger quantities of lignite. France not only flatly refused this request but increased her demands for coke to such an extent that deliveries amounting to 40 per cent of the entire German monthly production of coke had to be made during the last few months.

To counteract the coal shortage English coal had to be introduced in large quantities. Coast establishments, large industrial areas in the middle and south of Germany and even some of the works in the Ruhr district had to feed a part of their works with English fuel. According to official statistics, the imports of English coal amounted from July to September to 5,750,000 tons, which is equivalent to nearly 50 per cent of the imports of the year 1913. In spite of all exertions, 24 blast furnaces had to be banked for the time being owing to shortage of fuel.

The supply of ore and scrap on the other hand was fairly satisfactory. Scrap from France, Belgium, and England has been bought to a considerable extent. Altogether 550,000 tons were imported during the first nine months of last year. The price was invariably adapted to world market level and amounted in the middle of November to roughly 70 shillings ($15.75) per ton for the best steel scrap.

Notwithstanding that again and again great unrest could be observed among the working classes owing to the inflation wave, the German iron and steel industry on the whole has been spared the calamity of great strikes.

Output Barely Maintained

Apart from the utterly insufficient supply of fuel all preliminary conditions existed for an increased production of iron and steel. Since no official production statistics have been published as yet, we have to rely upon estimates based upon the business reports published from time to time and the communications of the various iron and steel associations. It can be estimated that during the first 10 months the production amounted to roughly 6,000,000 metric tons of pig iron and 8,000,000 metric tons of crude steel. The increase in iron and steel production by roughly 10 per cent as compared with the preceding year can be, generally speaking, explained by the following three causes. In the first place, a large number of works have started new or reconstructed plants. New blast furnaces have been erected, steel works extended and rolling mills modernized. In this connection may be mentioned the August Thyssen Hütte, the Dormunder Union, the Peiner Walzwerk, and the Stahlwerk Henningsdorf of the A. E. G. Great savings have been effected by all smelting works during the course of the year owing to more rational methods adopted for purposes of obtaining greater heat economy. A special heat economy station has been established in every industrial district, with the object of supervising the heat economizing methods in all the various works. The main share, however, of the increase of production may be traced back to the imports of fuel from abroad.

In spite of most strenuous efforts, the German smelting works have been quite unable to meet the huge demands of the finished steel producers. The blast furnaces and steel plants in the Ruhr district have not been able to supply more than 60 per cent of the quantities asked for, with the result that large tonnages of pig iron, semifinished steel, and rolled steel have been imported. The chief districts supplying pig iron, semifinished goods, and girders were Lorraine, Luxemburg, and the Saar. The railway administration has been compelled to place orders in Luxemburg since the German rolling mills are unable to agree to short delivery terms. Only small quantities have been imported from Polish Upper Silesia. Apart from black sheets imported to the south of Germany, English iron on the whole found a market only along the coast owing to its higher price. Total imports have recently been at seven times the prewar rate.

Exports on the other hand showed a steady decline up to September, which registered a gain. The total exports during the first nine months of 1922 amounted to 1,889,000 metric tons, or 39 per cent of the exports during the corresponding period in 1913. The causes of this decline may be traced in the first instance to the circumstance, that exporting is throttled in the interests of home consumption. Apart from this, however, there can be no doubt that the competitive capacity of German iron and steel on the world's markets has suffered considerably, and this all the more so since the 6 to 10 per cent export duty has not been rescinded. Foreign competitors, especially in Belgium and France, supported by cheap German coke deliveries, special tariffs, etc., have been in a position to underbid German quotations all along the line. Successful competition with England has been possible only with regard to a few products.

Exports to Russia Increased

Holland has remained the principal market for the products of Germany's iron industry. But in other German markets, such as Finland, Denmark, and the Russian border states, foreign competition has been observable in an increasing measure. With regard to overseas markets, India, Japan, China, and South America are about equal in importance. The exports of the German smelting works amounted to about 75,000 to 80,000 tons last year to each of these countries. The Russian business, especially in wire, bars, and shapes, has made a good start and promises further favorable development.

The unhealthiness of the German balance of trade in iron and steel

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may be regarded as the gravest symptom of declining competitive capacity on the world's markets, and as a sure sign of the coming turn in the tide. The re-establishment of the German iron industry's competitive capacity in a struggle against French and Belgian competition, as well as an increase in exports has now become the most vital question.

It thus will be easily understood why the industry has insisted for some time upon the removal of export taxes and duties and, beyond that, upon the reintroduction of special freight concessions for export. Such measures are all the more urgent in view of the fact that signs are accumulating from day to day that a turn of the tide is imminent.

Violent economic and social struggles seem unavoidable during the coming weeks and months. They threaten to assume all the more dangerous proportions as the foodstuff supply of the population has been gravely jeopardized by the failure of this year's crop, and several inflation riots already have taken place in several parts of the country. During the ensuing weeks it will not only be a question of reducing freights, wages, and prices, but above all a question of inducing the workers to do more work.

The iron and steel industry has prepared itself, both as regards organization and finances, as well as it could for the coming crisis. Most of the establishments have not allowed themselves to be misled financially by the numerically high profits made.

All its internal difficulties are aggravated by the uncertainty of Germany's foreign political fate, and the development of the reparations question. France is threatening an occupation of the Ruhr district and the sharpest compulsory measures. The negotiations between the German and French industry, which were started with a view to a better understanding, unfortunately have been suspended again. The outlook for the future of the German iron industry is thus perfectly uncertain and the industry is quite powerless and helpless with regard to its future development. The solution of the crisis is largely dependent upon the strength and skill of the new German government, as it is also upon a better understanding and a moderate reparations policy on the part of the entente.

Mixed Conditions in Central Europe

BY BRUNO SCHAPIRA

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IN CENTRAL Europe currency inflation has continued to spread at a speed which borders on madness. Only Czecho-Slovakia has succeeded holding back the paper flood at its frontiers but this appears to have been done at the expense of its iron, steel, and coal industries, considerable parts of which are at a standstill. Whereas the Czecho-Slovakian pig iron production decreased last year by one-third, in comparison with 1921, the Austrian production reached two-thirds of prewar tonnage, that of Hungary half of prewar and that of Poland a quarter.

The iron and steel industries of Poland, setting aside Polish Upper Silesia, are developing very slowly. One of the principal causes is to be found in the state of the railways. A special position is enjoyed by the highly developed Upper Silesian iron and steel industries. The Upper Silesian works continue to get good orders from Germany.

If, however, the high tide of the market in Germany comes to an end, the Upper Silesian works will prove to be dangerous competitors to the steelworks of the rest of Poland. The absence of coke in the country and the favorable state of tariffs have led to the importation of considerable quantities of pig iron and steel from abroad although in the spring the home market prices in Poland for bars, amounting to 150,000 marks per ton, were far below the world market prices, and the capacity of the works was but partly utilized. In strictly Polish works, French influence prevails. Those of Upper Silesia are still in German possession. Production in Poland, including that of Upper Silesia, amounted last year to 650,000 metric tons pig iron and 1,500,000 mteric tons of steel ingots.

In Russia the outlook for the iron and steel industries is still a desolate one. The monthly production of pig iron scarcely rises above 10,000 tons, the steel production reaching an average of 18,000 tons per month in a country where the monthly pig iron production in prewar times was 400,000 tons. But even these small quantities are sold only with difficulty, as an appropriate means of exchange is wanting. The primitive barter traffic meets with difficulties when it comes to any tonnage. The iron works in southern Russia are trying to obtain working capital by exporting part of their stock of iron and manganese.

For political reasons, the soviet government has refused up to date to approve the treaty concluded with the English Urquhart group, favoring of late the French to whom they are promising acknowledgement of prewar debts in return for certain political concessions. The German steel industry is endeavoring to gain firm footing in Russia, and has concluded important commercial agreements with the Russian government.

The only plant left in Hungary has secured a good supply of ore and coal from Czechia by treaty, thereby increasing the production of pig iron to 10,000 tons per month and the steel production to 12,000 tons per month.

The year 1922 brought a severe trial to the Czech iron and steel industries. Through the incessant climb of the Czech crown the industry lost its ability to compete in foreign markets because costs of production have not been reduced fast enough and the home market is contested by Austrian and German works. Of the 31 blast furnaces in Czecho-Slovakia only four were in blast at the end of the year.

The Czech works united last year in a selling organization that fixed the quota for every plant, bringing by degrees almost all the smaller steelworks to a standstill. Only the three great companies now are working on a reduced scale. At the end of 1922, the principal part of the crisis of deflation had been surmounted.

Throughout the year Czech producers grappled with the task of reducing prices. Through the lowering of the tax and cutting of prime costs the price of coke decreased in July from 660 to 450 crowns per ton. In the summer Belgium was supplying bars at 1390 crowns per ton. Czechia, however, was not below 1950 crowns, the Czech price being, moreover, at the works and the Belgian price f.o.b. Antwerp. In November the price of bars was cut to 1550 crowns for the home trade and 950 crowns for export.

The turnover of the Austrian iron and steel industries in 1922 was favorable. The decline in exchange enabled it to supplant foreign competition at home almost altogether and to export to other countries and overseas.

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Stabilization of the Austrian crown ensuing at the end of 1922 led to an ebb in the favorable turn of the market, Czech works tried hard to penetrate, and the Alpine company was compelled to consider wage reductions.

In January, the price of bars, expressed in crowns, was raised by 35 per cent, up to 194,000 crowns per ton and later in the same month to 220,000 crowns, rising in February to 320,000 crowns. In the spring, the Alpine company put its third blast furnace in working order, getting its coke supply from Germany. Three-fourths of the coke used was covered by supplies from the Ruhr. By mid-year the works were provided with orders for six months to come. In July, bars reached 670,000 crowns per ton, with a supplementary charge of 675 Czech crowns per ton. In September, bars climbed to 3,300,000 crowns per ton, two-thirds of the price being payable in Czech crowns.

In the autumn the Alpine company commenced invoicing in gold currency, demanding, moreover, an advance in Czech crowns. In October the price of bars in gold crowns was 130 per ton plus a supplement in Czech crowns of 725 per ton. In November, the Alpine company had to reduce the price of bars to 100 gold crowns and the additional payment in Czech crowns to 700 per ton.

Iron and Steel Prices

Iron Ore

LAKE SUPERIOR ORES
Per Gross Ton Lower Lake Ports

Old range Bessemer, 55 per cent iron	$5.95
Mesabi Bessemer, 55 per cent iron	5.70
Old Range nonbessemer, 51½ per cent iron	5.20
Mesabi nonbessemer, 51½ per cent iron	5.05

EASTERN LOCAL ORES
Cents per unit delivered at Eastern Pennsylvania and New Jersey furnaces

Foundry and basic, 53 to 63 per cent	9.50 to 10.50

FOREIGN IRON ORE
Cents per unit, c.i.f. Atlantic ports.

Spanish low phosphorus, 52 to 54 per cent	9.00 to 10.00
Algerian low phosphorus, 52 to 54 per cent	10.00 to 11.00
Swedish and Norwegian low phosphorus, 68 per cent	11.00 to 11.50
Swedish foundry or basic, 68 per cent	9.00 to 9.50
Spanish foundry or basic, 52 to 54 per cent	8.00 to 9.00

Manganese Ore

Brazilian, minimum 47 per cent c.i.f. Atlantic ports, 29 cents per unit, nominal. (Equivalent to $24.67 per gross ton or 51.4 cents per unit, duty paid, tidewater.)

Indian 48 to 50 per cent c.i.f. Atlantic ports, nominal.

Caucasian, 53 to 55 per cent, 29 cents c.i.f. Atlantic ports.

Fluor Spar

85 and 5% grade

Washed gravel, Kentucky and Illinois mines, per ton	$21.50

Rivets

Structural rivets, Pittsburgh	3.00c
Boiler rivets, Pittsburgh	3.10c
Rivets, ⅞-inch and smaller	65 and 5 off

Nuts and Bolts

NUTS
(Up to 1¼ and 1½ inches inclusive)

Hot pressed square or hexagon blank or tapped	$3.25 to $3.50 off list
Cold punched square or hexagon blank or tapped	$3.25 to $3.50 off list
Cold punched semifinished hexagon nuts ½-inch and larger	70-10-2½ off
Cold punched semifinished hexagon nuts ⅞-inch and smaller	70-10-5 off
Case hardened, finished, hexagon	65-5 off

Price f.o.b. Pittsburgh, Packages of 50.

CARRIAGE BOLTS
⅜ x 6 inches, smaller and shorter

Rolled thread	50-10-5 off
Cut thread	50 off
Larger and longer	50 off

MACHINE BOLTS
(⅜ x 4 inches, hot pressed nuts)

Rolled thread	60-5 off
Cut thread	50-10 off
Larger and longer	50-10 off
(⅜ x 4 inches, cold punched nuts)	
Cut thread	45 off
Larger and longer	45 off
Lag screws	50-10 to 60-5 off
Plow bolts Nos. 1, 2 and 3 heads	50-5 off
Tap bolts	30 off
Bolt ends with hot pressed nuts	50-10 off
Bolt ends with cold punched nuts	45 off
Blank bolts	50-10 off
Rough stud bolts with nuts	45 off

WASHERS

Wrought washers	$5.75 off list

Steel Pipe

Pittsburgh basing discounts, jobbers, carloads

	Black	Galvanized
Butt Weld		
⅛-inch	49	23½
¼ and ⅜-inch	55	29½
½-inch	60	46½
¾-inch	64	52½
1 to 3-inch	66	54½
Lap Weld		
2-inch	59	47½
2½ to 6-inch	63	51½
7 to 8-inch	60	47½
9 to 12-inch	59	46½
REAMED AND DRIFTED		
Butt Weld		
1 to 3-inch	64	52½
Lap Weld		
2-inch	57	45½
2½ to 6-inch	61	49½
EXTRA STRONG—PLAIN ENDS		
Butt Weld		
¼-inch	45	28½
¼ and ⅜-inch	51	34½
½-inch	57	46½
¾-inch	62	51½
1 to 1½-inch	64	53½
2 to 3-inch	65	54½
Lap Weld		
2-inch	57	46½
2½ to 4-inch	61	50½
4½ to 6-inch	60	49½
7 to 8-inch	56	43½
9 to 12-inch	50	37½
DOUBLE EXTRA STRONG		
Butt Weld		
½-inch	46	36½
¾ to 1½-inch	49	39½
2 to 2½-inch	51	41½
Lap Weld		
2-inch	45	36½
2½ to 4-inch	47	38½
4½ to 6-inch	46	37½
7 to 8-inch	42	29½

Wrought Iron Pipe

Pittsburgh basing discounts, jobbers, carloads

	Black	Galvanized
THREADS AND COUPLINGS		
Butt Weld		
¼ and ⅜-inch	+ 7	+33
½-inch	26	8
¾-inch	32	17
1 to 1½-inch	34	19
Lap Weld		
1¾ and 1½-inch	Upon application	
2-inch	29	15
2½ to 6-inch	32	19
7 to 12-inch	30	17
PLUGGED AND REAMED		
Two points less than above		
EXTRA STRONG, PLAIN ENDS		
Butt Weld		
¼ and ⅜-inch	+15	+48
½-inch	25	13
¾-inch	32	18
1 to 1¼-inch	34	20
Lap Weld		
2-inch	30	17
2½ to 4-inch	33	21
4½ to 6-inch	32	20
7 to 8-inch	25	13
9 to 12-inch	20	8

DOUBLE EXTRA STRONG		
Butt Weld		
½-inch	+37½	+49½
¾-inch	+18	+30
1-inch	+34	+46
1¼-inch	+18	+30
1½-inch	+17	+29
Lap Weld		
2 and 2½-inch	+ 3	+15
3 to 4-inch	2	+ 7
4½ to 6-inch	1	+ 7
8-inch	+ 4	+ 8

Boiler Tubes

L. C. L. discounts. C. L. 4 points larger

STEEL	
1¾-inch	17½ to 9½ off
2 and 2¼-inch	32 to 24 off
2½ to 3-inch	43 to 35 off
3¼ to 4-inch	48 to 40 off
CHARCOAL IRON	
1½-inch	+16
1¾-inch	+ 6
2 and 2¼-inch	4
2½ to 3-inch	9
3¼ to 4½-inch	11
SEAMLESS COLD DRAWN	
1-inch	51
1¼ and 1½-inch	43
1¾-inch	27
2 and 2¼-inch	30
2½ and 2¾-inch	34
3-inch	38
3¼ to 4-inch	43
4½ and 5-inch	35
SEAMLESS HOT ROLLED	
3-inch	40
3¼ to 4-inch	45

SEAMLESS STEEL MERCHANT BOILER TUBES

Extras:

Add $8 per net ton for more than four gages heavier than standard and add 10 per cent to theoretical weight.

Add 5 per cent for lengths over 24 feet and not over 26 feet.

Smaller tubes than 1-inch and lighter than standard gage to be sold at mechanical tubing list and discount.

Intermediate sizes and gages not listed above take price of next larger outside diameter and heavier gage.

SEAMLESS STEEL MECHANICAL TUBING

Base Discounts

Carbon, 0.10 to 0.20 per cent	85 off
Carbon, 0.30 to 0.40 per cent	83 off
Carbon, 0.40 to 0.50 per cent	82 off

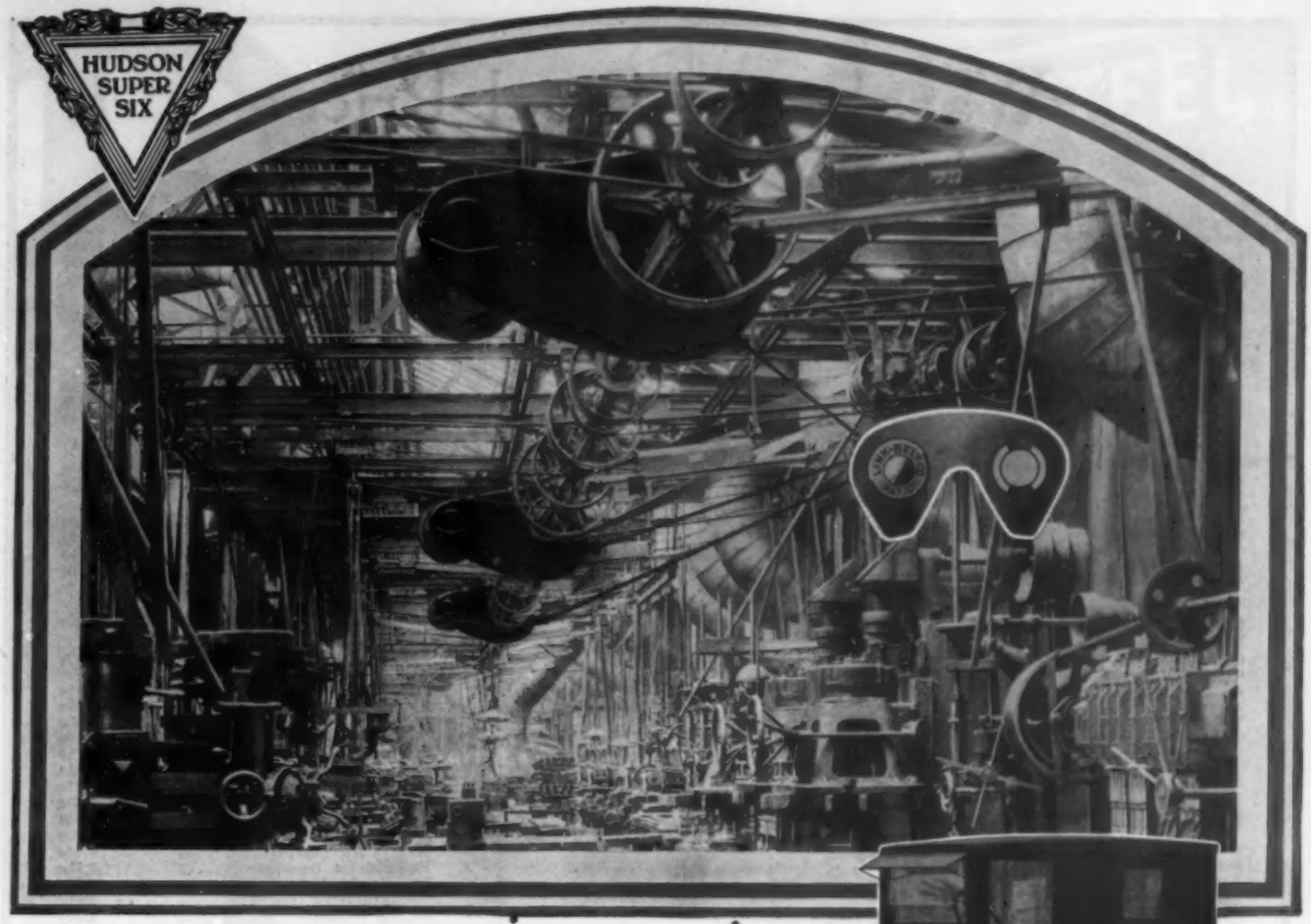
Plus usual differentials and extras for cutting.

SEAMLESS STEEL LOCOMOTIVE AND SUPERHEATER TUBES

Net prices per foot, f.o.b. Pittsburgh

Outside diameter	Gage	Price
2-inch	12-gage	14c
2-inch	11-gage	15c
2-inch	10-gage	16c
2¼-inch	12-gage	16c
2¼-inch	11-gage	17c
2¼-inch	10-gage	19c
3-inch	7-gage	34c
1½-inch	9-gage	13¾c
5⅜-inch	9-gage	53c
5½-inch	9-gage	55c

Plus usual extras for forming and for long lengths.



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LINK-BELT

Warehouse Steel Prices

Quotations in Cents Per Pound at Leading Market Centers

STEEL BARS	
Boston	3.065c
Buffalo	3.10c
Chicago	2.80c
Cincinnati	2.95c to 3.10c
Cleveland	2.91c
Detroit	3.00c
New York	3.04c
Philadelphia	3.00c
San Francisco	3.40c
Seattle	3.60c
St. Louis	2.90c
St. Paul	3.05c
Los Angeles	3.50c
IRON BARS	
Boston	3.065c
Buffalo	3.10c
Chicago	2.80c
Cincinnati	3.10c
Detroit	3.00c
New York	3.04c
Philadelphia	3.00c
St. Louis	2.90c
SHAPES, STRUCTURAL	
Boston	3.165c
Buffalo	3.20c
Chicago	2.90c
Cincinnati	3.05c to 3.20c
Cleveland	3.01c
Detroit	3.10c
New York	3.14c
Philadelphia	3.10c
San Francisco	3.40c
Seattle	3.60c
St. Louis	3.00c
St. Paul	3.15c
Los Angeles	3.60c
PLATES	
Boston	3.165c
Boston 3/16-inch	3.04c
Buffalo	3.20c
Chicago	2.90c
Cincinnati	2.95c to 3.20c
Cleveland	3.01c
Detroit	3.10c
New York	3.14c
Philadelphia	3.10c
San Francisco	3.50c
Seattle	3.60c
St. Louis	3.00c
St. Paul	3.15c
Los Angeles	3.75c
NO. 10 BLUE ANNEALED SHEETS	
Boston, 1/4-inch	4.15c
Buffalo	4.05c
Chicago	4.00c
Cincinnati	3.75c to 4.00c
Cleveland	3.70c to 3.76c
Detroit	3.95c
New York	4.19c
Philadelphia	3.85c
San Francisco	4.50c
Seattle	4.85c
St. Louis	4.10c
St. Paul	4.25c
Los Angeles	4.70c
NO. 28 BLACK SHEETS	
Boston	5.40c
Buffalo	4.85c
Chicago	4.85c
Cincinnati	4.00c
Cleveland	4.40c
Detroit	4.40c
New York	4.80c to 4.90c
Philadelphia	4.60c
San Francisco	6.05c
Seattle	5.85c
St. Louis	4.95c
St. Paul	5.10c
Los Angeles	6.10c
NO. 28 GALVANIZED SHEETS	
Boston	6.40c
Buffalo	5.85c
Chicago	5.85c
Cincinnati	5.20c
Cleveland	5.40c
Detroit	5.40c
New York	5.80c to 5.90c
Philadelphia	5.75c
San Francisco	6.90c
Seattle	6.85c
St. Louis	5.95c
Los Angeles	6.90c
BANDS	
Boston	4.25c
Buffalo	3.90c
Chicago	3.55c
Cincinnati	3.70c to 3.85c
Cleveland	3.71c
Detroit	3.80c
New York	3.84c
Philadelphia	3.80c
San Francisco	4.05c
Seattle	4.35c
Los Angeles	4.40c
HOOPS	
Boston	4.75c
Buffalo	4.10c
Cleveland	3.71c
Detroit	4.20c
New York	4.39c
Philadelphia	4.25c
Seattle	5.00c
COLD ROLLED STEEL	
Boston (rounds)	4.00c
Boston (shapes)	4.50c
Buffalo (rounds)	3.95c
Buffalo (shapes)	4.45c
Chicago (rounds)	3.80c
Chicago (shapes)	4.30c
Cincinnati (rounds)	3.75c
Cleveland (rounds)	3.75c
Cleveland (shapes)	4.25c
Detroit (rounds)	3.80c
Detroit (shapes)	4.30c
New York	3.90c
New York (shapes)	4.40c
Philadelphia (rounds)	3.85c
Philadelphia (shapes)	4.35c
San Francisco (rounds)	5.00c
Seattle (rounds)	5.25c
Los Angeles (rounds)	5.10c

Coke By-Products Prices Hold Firm

(*Concluded from Page* 83)

a decided improvement in both production and demand. The year ended with heavy commitments for motor fuel, but on the other hand a shortage was found in toluol, solvent naphtha and commercial xylol.

Production of sulphate of ammonia during the first quarter was limited, with domestic demand light and export demand fair.

While the coal strike started April 1, the by-products plants felt this to no great extent until mid-summer. The usual yearly contracts with the domestic fertilizer trade were made in June and this under the circumstances placed quite a burden on production. About Oct. 1 several plants fell behind on their contracts. Production since the early part of September gradually increased until at the end of the year, when the output was normal approximately. Export buying dropped of in the early spring and there was practically none over the remainder of the year. Japan and Java, usually large buyers, did not close on their normal tonnage. The domestic price on sulphate of ammonia, showed a slight upward tendency throughout the year.

The market on naphthalene in flakes and balls reflected great steadiness, prices being unchanged until near the end of the year.

Composite Market Record

Monthly Averages of Fourteen Iron and Steel Products, 1917-1922. Compiled by Iron Trade Review

1922		November	$34.71	August	$68.93
Dec. 21	$40.54	October	35.46	July	68.29
Dec. 13	40.23	September	35.34	June	67.89
Dec. 6	40.69	August	35.99	May	68.26
November	42.08	July	38.14	April	67.49
October	43.60	June	41.87	March	65.47
September	43.79	May	43.32	February	65.63
August	39.79	April	43.84	January	59.40
July	37.50	March	45.37	Average for year	65.59
June	36.96	February	48.81	**1919**	
May	36.49	January	51.98	December	54.88
April	34.42	Average for year	40.74	November	51.28
March	32.97	**1920**		October	48.76
February	32.86	December	54.04	September	48.35
January	33.35	November	63.75	August	48.27
1921		October	68.61	July	47.86
December	33.99	September	69.28	June	47.88

May	$48.29	February	$56.67	December	56.68
April	48.45	January	56.67	November	58.29
March	52.28	Average for year	56.68	October	67.75
February	53.71	**1917**		September	83.18
January	53.81	December	56.68	August	89.69
Average for year	50.32	November	58.29	July	89.56
1918		October	67.75	June	82.66
December	57.24	September	83.18	May	73.96
November	55.67	August	89.69	April	66.48
October	57.53	July	89.56	March	61.07
September	56.56	June	82.66	February	56.76
August	56.67	May	73.96	January	55.10
July	56.66	April	66.48	Average for year	70.10
June	56.62	March	61.07		
May	56.59	February	56.76		
April	56.59	January	55.10		
March	56.71	Average for year	70.10		

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If you are not receiving our Stock-list we shall be glad to send it to you regularly upon request.

Upson Works

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THE
BOURNE-FULLER CO.
Iron, Steel
Pig Iron
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CLEVELAND

New York **Chicago** **Detroit**
San Francisco
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Iron and Steel Production

Compiled By IRON TRADE REVIEW

Pig Iron

	-Stacks- No.	In	Output- Total	Av. daily
1907				
January	376	311	2,174,801	69,509
February	374	308	2,047,036	73,109
March	377	304	2,186,709	70,539
April	378	327	2,226,708	74,223
May	391	329	2,291,030	73,904
June	392	341	2,237,420	74,580
July	396	335	2,253,243	72,685
August	397	329	2,243,656	72,376
September	399	329	2,174,148	72,471
October	401	314	2,359,690	76,119
November	398	226	1,820,558	60,685
December	398	154	1,234,733	39,830
Total			25,299,732	
1908				
January	398	139	1,081,813	34,316
February	401	150	1,086,809	37,476
March	398	154	1,229,856	39,672
April	398	146	1,155,122	38,504
May	396	145	1,168,002	37,677
June	395	154	1,106,300	36,876
July	397	166	1,228,604	39,632
August	399	181	1,366,019	44,065
September	399	189	1,416,252	47,208
October	400	200	1,573,824	50,764
November	402	212	1,582,314	52,744
December	403	221	1,723,664	55,602
Total			15,680,140	
1909				
January	406	234	1,787,473	57,683
February	407	233	1,682,470	60,088
March	406	229	1,822,024	58,793
April	406	224	1,731,406	57,687
May	407	236	1,866,757	60,218
June	408	240	1,929,929	64,334
July	409	258	2,088,620	67,375
August	412	278	2,232,642	72,021
September	413	297	2,378,655	79,186
October	413	309	2,589,681	84,001
November	414	311	2,532,740	84,425
December	416	314	2,682,702	86,539
Total			25,337,002	
1910				
January	416	311	2,599,995	83,871
February	417	311	2,429,525	86,747
March	417	310	2,588,736	83,580
April	418	291	2,477,700	82,590
May	421	206	1,871,388	60,367
June	420	271	2,288,279	76,276
July	420	254	2,158,124	69,617
August	422	244	2,103,793	67,864
September	420	234	2,048,461	68,282
October	421	230	2,086,205	67,297
November	421	218	1,910,385	63,679
December	421	193	1,779,899	57,192
Total			26,840,314	
1911				
January	421	210	1,766,658	56,985
February	421	226	1,781,285	63,617
March	421	236	2,165,764	69,867
April	421	220	2,044,904	68,163
May	421	206	1,871,388	60,367
June	421	202	1,773,282	59,109
July	423	196	1,776,108	57,294
August	423	206	1,921,832	61,995
September	423	216	1,973,918	65,797
October	421	214	2,092,061	67,486
November	421	214	1,999,100	66,637
December	422	215	2,032,301	65,558
Total			23,198,601	
1912				
January	421	227	2,052,806	66,220
February	422	235	2,098,796	72,372
March	420	237	2,411,529	77,791
April	421	239	2,377,621	79,254
May	423	243	2,503,341	80,753
June	424	242	2,433,737	81,125
July	422	245	2,402,567	77,502
August	423	255	2,500,163	80,650
September	419	262	2,444,454	81,482
October	422	280	2,683,645	86,569
November	423	289	2,639,562	87,985
December	423	291	2,777,292	89,590
Total			29,325,513	
1913				
January	423	297	2,287,800	89,929
February	423	306	2,778,670	92,095
March	423	278	2,562,823	89,123
April	421	297	2,754,353	91,812
May	421	285	2,716,825	90,865
June	422	283	2,816,883	87,229
July	422	264	2,658,275	82,525
August	424	260	2,537,318	81,839
September	425	258	2,594,098	83,137
October	425	244	2,439,924	81,933
November	424	225	2,529,960	74,322
December	424	191	1,976,138	63,746
Total			30,652,767	
1914				
January	423	199	1,879,336	60,624
February	423	219	1,888,607	67,450
March	423	232	2,341,551	75,534
April	422	212	2,261,501	75,383
May	422	198	2,097,019	67,646
June	422	193	1,904,566	63,486
July	422	187	1,955,324	63,075
August	422	187	1,996,483	64,403
September	422	180	1,882,718	62,757
October	422	162	1,767,227	57,007
November	421	150	1,501,269	50,042
December	421	154	1,495,325	48,236
Total			22,970,926	
1915				
January	421	165	1,591,324	51,323
February	421	179	1,666,592	59,521
March	421	190	2,046,280	66,009
April	421	197	2,114,518	70,484
May	421	207	2,255,157	72,747
June	421	221	2,369,932	78,998
July	421	234	2,563,311	82,687
August	421	246	2,774,825	89,510
September	420	266	2,834,342	94,478
October	420	276	3,120,340	100,656
November	421	285	3,035,235	101,174
December	421	295	3,201,605	103,278
Total			29,573,161	
1916				
January	421	304	3,171,878	102,319
February	421	312	3,078,548	106,157
March	422	315	3,327,630	107,343
April	422	320	3,225,496	107,517
May	423	321	3,364,584	108,535
June	423	325	3,213,818	107,127
July	419	316	3,221,127	103,907
August	419	317	3,197,838	103,156
September	419	326	3,208,041	106,935
October	419	328	3,508,180	113,167
November	420	322	3,317,805	110,593
December	422	309	3,184,178	102,715
Total			39,019,123	
1917				
January	422	310	3,159,839	101,930
February	422	317	2,649,935	94,641
March	423	331	3,255,813	105,026
April	425	333	3,328,061	110,936
May	425	340	3,413,677	110,119
June	427	347	3,260,234	108,675
July	429	351	3,337,442	107,659
August	431	355	3,238,970	104,483
September	431	344	3,140,742	104,691
October	433	354	3,296,286	106,332
November	434	344	3,198,597	106,620
December	435	321	2,885,380	93,077
Total			38,164,976	
1918				
January	435	294	2,403,227	77,523
February	435	319	2,318,242	82,794
March	438	338	3,209,996	103,548
April	437	351	3,273,355	109,112
May	437	360	3,451,884	111,351
June	437	353	3,316,148	110,538
July	437	364	3,408,584	109,954
August	439	371	3,378,479	108,983
September	438	364	3,413,223	113,774
October	437	364	3,482,392	112,335
November	437	360	3,347,844	111,595
December	435	351	3,434,114	110,602
Total			38,437,488	
1919				
January	435	330	3,306,279	106,654
February	435	311	2,943,347	105,270
March	435	279	3,088,023	99,614
April	435	216	2,474,374	82,479
May	433	197	2,107,729	67,991
June	433	199	2,144,028	70,467
July	434	240	2,424,212	78,200
August	432	266	2,742,081	88,453
September	433	163	2,480,790	82,692
October	432	216	1,864,424	60,142
November	432	252	2,407,369	80,244
December	432	262	2,626,074	84,711
Total			30,578,730	
1920				
January	432	285	3,012,373	97,172
February	432	305	2,984,257	102,904
March	433	315	3,375,768	108,895
April	433	278	2,752,670	91,754
May	433	297	2,991,825	96,510
June	433	302	3,046,623	101,553
July	434	291	3,043,918	98,190
August	434	306	3,145,536	101,168
September	434	317	3,124,308	104,173
October	435	290	3,288,341	106,075
November	435	255	2,935,081	97,836
December	435	202	2,700,268	87,105
Total			16,400,968	
1921				
January	436	184	2,414,753	77,895
February	436	155	1,927,088	68,906
March	436	103	1,593,542	51,447
April	436	96	1,190,751	39,691
May	436	90	1,215,272	39,202
June	436	74	1,064,007	35,465
July	435	69	864,642	27,892
August	435	69	954,901	30,802
September	435	84	985,795	32,857
October	435	95	1,234,450	39,821
November	429	120	1,414,958	47,165
December	429	123	1,642,775	52,992
Total			16,506,564	
1922				
January	430	127	1,545,804	53,090
February	429	139	1,630,180	58,220
March	429	155	2,034,784	65,638
April	429	161	2,070,161	69,005
May	427	175	2,309,348	74,495
June	427	191	2,362,455	78,748
July	427	170	2,403,030	77,517
August	427	143	1,810,665	58,408
September	427	189	2,024,008	67,466
October	426	218	2,629,655	84,827
November	428	240	2,846,110	94,870

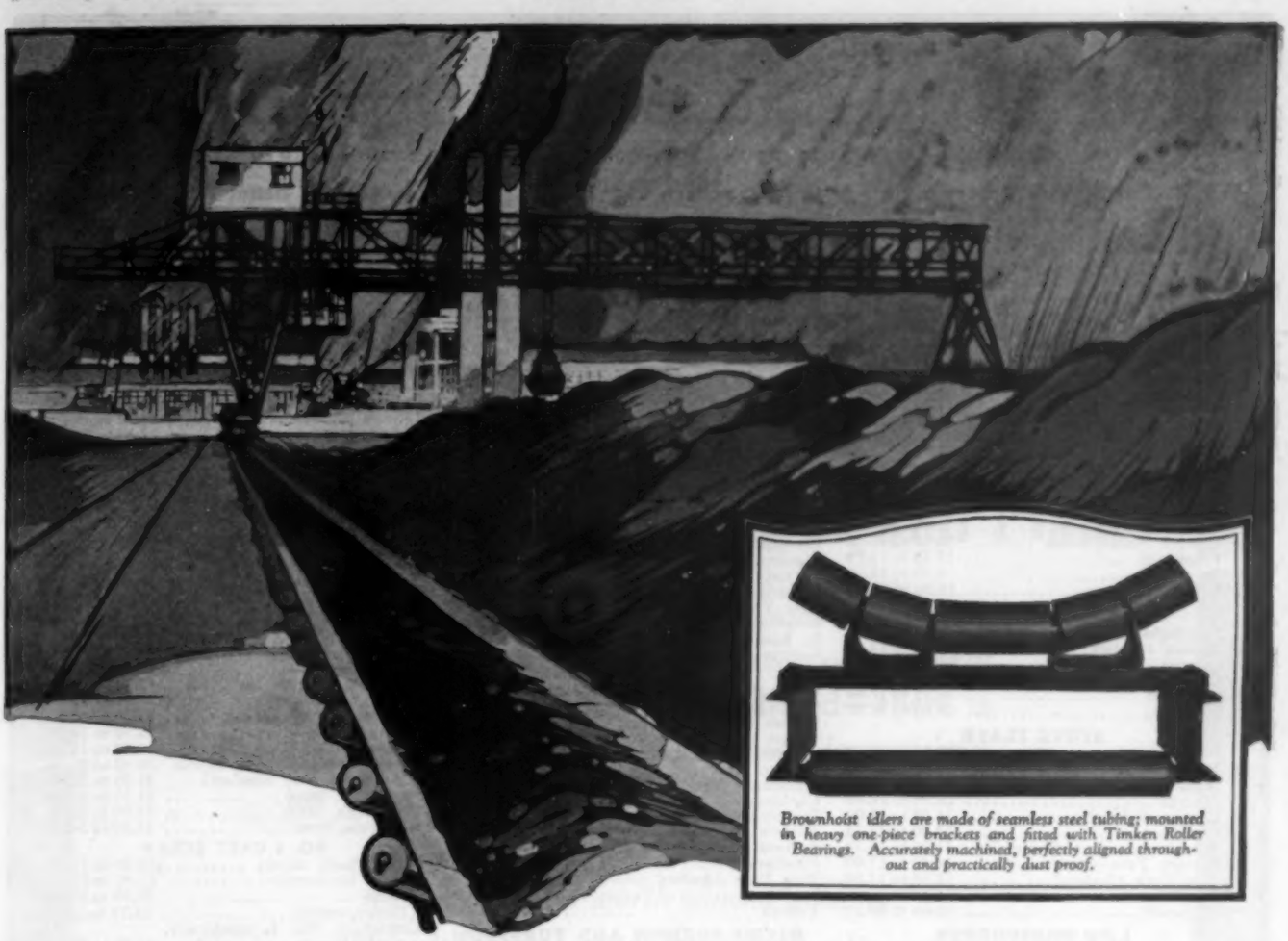
Ingots and Castings

By American Iron and Steel Institute

	Ingots	Castings	Total
1910	25,154,087	940,832	26,094,919
1911	23,029,479	646,627	23,676,106
1912	30,284,682	966,621	31,251,303
1913	30,280,130	1,020,744	31,300,874
1914	22,819,784	693,246	23,513,030
1915	31,284,212	866,824	32,151,036
1916	41,401,917	1,371,763	42,773,680
1917	43,619,200	1,441,407	45,060,607
1918	43,051,022	1,411,410	44,462,432
1919	33,694,795	976,437	34,671,232
1920	40,881,392	1,251,542	42,132,934
1921	19,184,084	559,713	19,743,797

Monthly Ingot Output

1922	Gross Tons 87.5 per cent of capacity	Indicated total
January	1,593,482	1,820,000
February	1,745,022	1,995,000
March	2,370,751	2,710,000
April	2,444,513	2,800,000
May	2,711,141	3,100,000
June	2,634,477	3,010,000
July	2,487,104	2,840 000
August	2,214,582	2,530,000
September	2,373,779	2,710,000
October	2,872,415	3,280,000
November	2,889,297	3,300,000


Brownhoist idlers are made of seamless steel tubing; mounted in heavy one-piece brackets and fitted with Timken Roller Bearings. Accurately machined, perfectly aligned throughout and practically dust proof.

Built To Reduce Conveying Costs

Brownhoist Products

Heavy Dock Machinery
Locomotive Cranes
Monorail Trolleys
Concrete Bunkers
Chain Conveyors
Belt Conveyors
Coal Crushers
Bridge Cranes
Buckets

Literature on request

The first cost is of course important in choosing belt conveyor equipment. But, because that cost is spread over a long period of service, up-keep is a more important factor.

Realizing this, Brownhoist Belt Conveyors have been designed to reduce up-keep cost to a minimum.

Up-keep in belt conveyors is measured by wear on the belt and on the idlers and by power requirements. Brownhoist idlers are designed to give perfect alignment and a minimum of frictional resistance. Timken Roller Bearings are standard in all Brownhoist idlers and each bearing is greased by means of a high pressure lubrication system.

These features undoubtedly make the Brownhoist idlers last longer and assure longer life for the conveyor belt.

The Brown Hoisting Machinery Co., *Cleveland, Ohio*
Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans

BROWNHOIST

MATERIAL HANDLING EQUIPMENT

Iron and Steel Scrap Prices

CORRECTED TO TUESDAY NOON GROSS TONS DELIVERED TO CONSUMER

Steel Works Scrap

HEAVY MELTING STEEL

Birmingham	$15.00 to 16.00
Boston (dealers)	14.00 to 14.50
Chicago	17.25 to 17.75
Buffalo	19.00 to 19.50
Cincinnati	16.50 to 17.00
Cleveland	18.50 to 19.00
Detroit (dealers)	16.00 to 16.50
Eastern Pennsylvania	16.00 to 17.00
New York (dealers)	12.50 to 13.00
Pittsburgh	20.50 to 21.00
San Francisco	12.50 to 13.00
St. Louis	15.50 to 16.00
Valleys	20.50 to 21.00
No. 1 railroad steel New York (dealers)	13.75 to 14.25

BUNDLED SHEETS

Buffalo	$14.00 to 15.00
Cleveland	12.50 to 13.00
Cincinnati	12.00 to 12.50
Eastern Pennsylvania	14.50 to 15.00
Pittsburgh	17.50 to 18.00
St. Louis	9.50 to 10.00
Valleys	16.00 to 16.50

STEEL RAILS, SHORT

Birmingham	$20.00 to 22.00
Boston (dealers)	14.00 to 14.50
Chicago	20.00 to 20.50
Cincinnati	19.00 to 20.00
Cleveland	16.25 to 17.00
St. Louis	19.00 to 19.50

STOVE PLATE

Birmingham	$17.00 to 18.00
Boston (consumers)	16.00 to 17.00
Buffalo	17.00 to 18.00
Chicago	18.50 to 19.00
Cincinnati (net)	14.00 to 15.00
Cleveland	17.00 to 17.75
Detroit (net ton) (dealers)	13.00 to 13.50
Eastern Pennsylvania	16.00 to 17.00
New York (dealers)	12.50 to 13.50
Pittsburgh	16.50 to 17.00
St. Louis	16.00 to 16.50

LOW PHOSPHORUS

Buffalo	$21.00 to 22.00
Cincinnati	18.00 to 18.50
Eastern Pennsylvania	22.00 to 23.00
Pitts. billet and bloom crops	24.00 to 24.50

SHOVELING STEEL

Chicago	$17.25 to 17.50
Pittsburgh	17.50 to 18.00
St. Louis	15.00 to 15.50

KNUCKLES, COUPLERS & SPRINGS

Chicago	$23.00 to 23.50
Eastern Pennsylvania	21.00 to 22.00
Pittsburgh	23.00 to 23.50
St. Louis	22.50 to 23.00

COMPRESSED SHEETS

Buffalo	$16.50 to 17.00
Chicago	14.75 to 15.25
Pittsburgh	19.50 to 20.00
Cleveland	16.25 to 16.75
Detroit (dealers)	15.00 to 15.50
Valleys	19.00 to 19.50

FROGS, SWITCHES, GUARDS

Chicago	$17.25 to 17.75
Eastern Pennsylvania	16.00 to 17.00
St. Louis	16.00 to 16.50

BOILER PLATE, CUT

St. Louis (dealers)	$10.50 to 11.00

ANGLE BARS—STEEL

Chicago	$19.00 to 19.50
St. Louis	16.00 to 16.50

Iron Mill Scrap

RAILROAD WROUGHT

Birmingham	$19.00 to 20.00
Boston (dealers)	14.00 to 14.50
Buffalo	19.00 to 19.50
Chicago, No. 1	17.50 to 18.00
Chicago, No. 2	17.25 to 17.75
Cincinnati, No. 1	14.50 to 15.50
Cleveland, No. 1	12.00 to 12.25
Eastern Pennsylvania, No. 1	18.50 to 19.00
Pittsburgh, No. 1	18.50 to 19.00
Pittsburgh, No. 2	20.50 to 21.00
New York, No. 1 (dealers)	14.50 to 15.00
St. Louis, No. 2	16.50 to 17.00
St. Louis	16.00 to 16.50

WROUGHT PIPE

Boston (dealers)	$9.50 to 10.00
Buffalo	14.00 to 14.50
Eastern Pennsylvania	14.50
New York (dealers)	10.50 to 11.00

YARD WROUGHT

Boston	$13.00 to 13.50
Eastern Pennsylvania, No. 1	17.00 to 18.00

CITY WROUGHT

New York, long	$13.00 to 13.50

BUSHELING

Buffalo, No. 1	$17.00 to 17.50
Chicago, No. 1	16.75 to 17.25
Chicago, No. 2	10.25 to 10.75
Cincinnati, No. 1	14.00 to 15.00
Cleveland, No. 1	14.00 to 14.50
Cleveland, No. 2	12.00 to 12.25
Detroit (dealers)	10.00 to 10.50
Eastern Pennsylvania, No. 1	14.50 to 15.00
Pittsburgh, No. 1	17.00 to 17.50
St. Louis, No. 1	15.00 to 15.50

MACHINE SHOP TURNINGS

Birmingham	$10.00 to 11.00
Boston (dealers)	11.00 to 11.50
Buffalo	15.00 to 16.00
Chicago	10.00 to 10.50
Cleveland	15.00 to 15.50
Cincinnati (net)	11.50 to 12.00
Detroit (dealers)	11.50 to 12.00
Eastern Pennsylvania	15.00 to 15.50
New York (dealers)	12.00 to 12.50
Pittsburgh	15.75 to 16.25
St. Louis	10.00 to 10.50
Valleys	16.00 to 16.50

CAST IRON BORINGS

Birmingham (chemical)	$15.00 to 16.00
Birmingham, borings (plain)	10.00 to 11.00
Boston (chemical)	16.00 to 16.50
Boston (dealers)	16.50 to 17.00
Buffalo	16.50 to 17.00
Chicago	14.50 to 15.00
Cincinnati (net)	12.00 to 12.50
Cleveland	16.50 to 17.00
Detroit (dealers)	13.00 to 13.50
Eastern Pennsylvania	16.00 to 17.00
Eastern Pennsylvania (chemical)	20.00 to 22.00
Pittsburgh	17.50 to 18.00
New York (dealers' price)	12.00 to 12.50
St. Louis	12.50 to 14.00
Valleys	17.75 to 18.00

MIXED BORINGS AND TURNINGS
(For blast furnace use)

Boston (dealers)	$11.00 to 11.50
Cleveland, small	16.00 to 16.25
Detroit (dealers)	13.00 to 13.50
Eastern Pennsylvania	14.50 to 15.00
New York (dealers)	11.75

IRON AXLES

Birmingham	$24.00 to 26.00
Boston	27.00 to 28.00
Buffalo	24.00 to 25.00
Chicago	27.00 to 27.50
Cincinnati	23.00 to 24.00
Eastern Pennsylvania	28.00 to 30.00
New York (dealers)	24.00 to 25.00
Pittsburgh	29.00 to 30.00
St. Louis	29.00 to 29.50

IRON RAILS

Buffalo	$19.00 to 20.00
Chicago	22.00 to 22.50
Cincinnati	16.00 to 17.00
Cleveland	18.00 to 18.50
St. Louis	20.50 to 21.00

PIPES AND FLUES

Chicago	$12.00 to 12.50
Cincinnati	11.00 to 12.00
Cleveland	13.00 to 13.50
St. Louis	10.50 to 11.00

RAILROAD GRATE BARS

Buffalo	$16.00 to 17.00
Chicago	18.25 to 18.75
Cleveland	17.00 to 17.75
Eastern Pennsylvania	16.00 to 16.50
New York (dealers)	13.00 to 13.50
St. Louis	16.50 to 17.00

FORGE FLASHINGS

Boston (dealers)	$11.00 to 11.50
Chicago, small	12.50 to 13.00
Cleveland	12.50 to 13.00
Cleveland, large	12.25 to 12.75
Detroit (dealers)	11.50 to 12.00

FORGE SCRAP

Boston	$10.50 to 11.00
Chicago	17.25 to 17.75
Eastern Pennsylvania, No. 1	15.00 to 15.50

ARCH BARS AND TRANSOMS

Chicago	$23.00 to 23.50
St. Louis	21.00 to 21.50

ANGLE BARS—IRON

Chicago	$23.00 to 23.50
St. Louis	21.00 to 21.50

Iron and Steel Works Scrap

AXLE TURNINGS

Boston (dealers)	$11.50 to 12.00
Buffalo	17.50 to 18.50
Chicago	15.25 to 15.75
Cleveland	17.00 to 17.25
Eastern Pennsylvania	15.00 to 16.00
Pittsburgh	17.50 to 18.00
St. Louis	13.00 to 13.50

STEEL CAR AXLES

Birmingham	$24.00 to 26.00
Boston (dealers)	22.00 to 23.00
Buffalo	21.00 to 22.00
Chicago	19.00 to 19.50
Cleveland	22.00 to 22.50
Eastern Pennsylvania	24.00 to 25.00
New York (dealers)	17.00 to 18.00
Pittsburgh	20.00 to 21.00
St. Louis	20.00 to 20.50

SHAFTING

Boston (dealers)	$22.00 to 23.00
Chicago	21.75 to 22.25
Eastern Pennsylvania	21.00 to 23.00
New York (dealers)	16.00 to 16.50
St. Louis	19.00 to 19.50

Iron Foundry Scrap

CAR WHEELS

Birmingham, iron	$17.00 to 18.00
Birmingham, tram car	17.50 to 18.50
Boston (consumers)	20.00 to 21.00
Buffalo, iron	21.00 to 22.00
Chicago, iron	23.50 to 24.00
Cincinnati	19.00 to 19.50
Eastern Pennsylvania, cupola	20.00 to 21.00
New York, iron (dealers)	21.00 to 22.00
Pittsburgh, iron	21.50 to 22.00
Pittsburgh, steel	23.00 to 23.50
St. Louis, iron	24.00 to 24.50

NO. 1 CAST SCRAP

Birmingham, cupola	$20.00 to 21.00
Boston (consumers)	21.00 to 22.00
Buffalo	21.00 to 22.00
Chicago, cupola	22.75 to 23.25
Cincinnati, No. 1, machinery, cupola (net)	21.00 to 22.00
Cleveland, cupola	20.00 to 21.00
Detroit (net ton) (dealers)	15.00 to 15.50
Eastern Pennsylvania, cupola	20.00 to 21.00
New York, cupola (dealers)	17.50 to 18.25
Pittsburgh, cupola	22.00 to 22.50
San Francisco	25.00 to 26.00
St. Louis, agricultural	19.00 to 19.50
St. Louis, railroad	19.50 to 20.00
Valleys	22.00 to 22.50

HEAVY CAST

Boston (consumers)	$18.50 to 19.50
Buffalo	18.00 to 19.00
Cleveland	16.00 to 16.25
Detroit, automobile (net ton)	18.00 to 18.50
Eastern Pennsylvania	16.00 to 18.00
New York (dealers)	15.50 to 16.00
Pittsburgh	18.50 to 19.00

MALLEABLE

Boston (railroad)	$19.50 to 20.00
Buffalo	20.00 to 21.00
Chicago, railroad	23.00 to 24.00
Chicago, agricultural	23.00 to 24.00
Cincinnati, agricultural	17.00 to 18.00
Cincinnati, railroad	17.50 to 18.50
Cleveland, agricultural	19.00 to 19.25
Cleveland, railroad, nominal	20.00 to 20.50
Detroit (dealers)	18.50 to 19.00
Eastern Pennsylvania, railroad	19.00 to 20.00
Pittsburgh, railroad	20.00 to 20.50
Pittsburgh, agricultural	17.00 to 17.50
St. Louis, agricultural	19.50 to 20.00
St. Louis, railroad	19.50 to 20.00

Miscellaneous Scrap

RAILS FOR ROLLING
5 feet and over

Birmingham	$17.50 to 19.00
Boston (dealers)	13.50 to 14.00
Chicago	18.25 to 18.75
Cleveland	20.50 to 21.00
Eastern Pennsylvania	19.00 to 19.50
New York (dealers)	16.00 to 16.50
Pittsburgh district	20.50 to 21.00
St. Louis	17.50 to 18.00

LOCOMOTIVE TIRES

Chicago	$17.50 to 18.00
St. Louis	17.00 to 17.50

LOW PHOSPHORUS PUNCHINGS

Chicago	$19.00 to 19.50
Eastern Pennsylvania	22.00 to 24.00
Pittsburgh	23.00 to 24.00

LOGEMANN

Double Ram Hydraulic

Scrap-Metal Presses

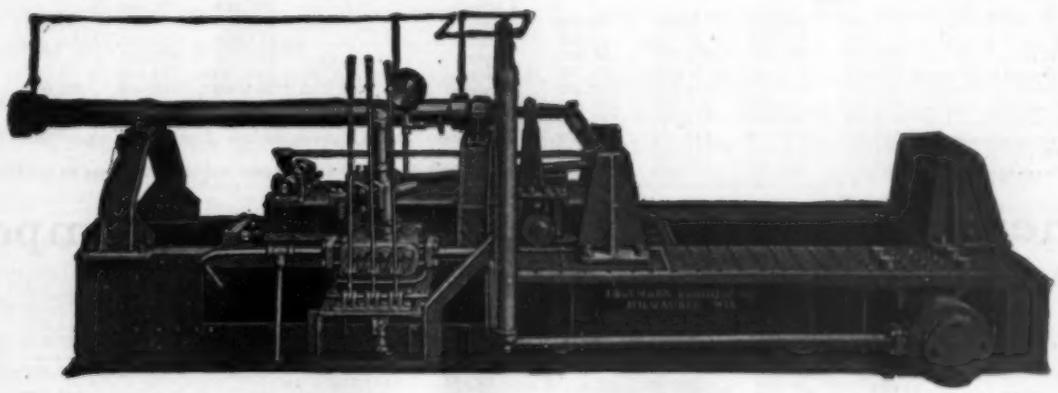
STANDARD

In Hundreds of Mills, Yards and Plants

Hydraulic-compressed scrap always commands the best prices. It is more conveniently stored—more economically handled—there is less loss from corrosion—less heat is required for remelting.

Loose Scrap is worth almost nothing.
Compare this with prices paid for "hydraulic-compressed."

LOGEMANN BROTHERS CO., 3126 Burleigh St. MILWAUKEE, WIS.



We build Balers for All Purposes

Hand-balers for waste-paper, power and hydraulic balers for the textile trades, hydraulic presses for metal and waste trades.

Also Hydraulic Shaft Straighteners, Etc.

European Iron and Steel Statistics

Gross Tons

Pig Iron Production

	United Kingdom	France	Belgium	Luxemburg
Monthly average 1912..	729,000	405,000	192,000	184,800
Monthly average 1913..	855,000	427,000	203,800	209,000
Monthly average 1919..	617,000	198,000	20,600	50,000
Monthly average 1920..	667,300	281,700	92,700	58,000
Monthly average 1921..	217,600	280,300	71,800	79,600
1921				
January	642,100	288,000	110,600	93,500
February	463,600	287,400	103,700	81,700
March	386,000	295,300	104,700	27,600
April	60,300	287,700	94,700	70,800
May	13,600	278,100	74,600	78,700
June	800	280,900	67,400	81,700
July	10,200	262,400	44,600	70,000
August	94,200	250,800	43,800	72,800
September	158,300	239,800	59,800	86,200
October	235,500	251,800	45,800	98,800
November	271,800	290,000	59,800	92,400
December	275,000	296,300	73,000	100,800
Total for 1921.....	2,611,400	3,308,500	862,500	955,000
1922				
January	288,000	307,000	92,700	99,900
February	300,100	318,000	90,300	95,200
March	389,800	370,000	116,500	130,900
April	394,300	377,300	112,000	128,800
May	407,900	435,300	117,100	139,300
June	369,200	409,300	113,100	141,500
July	399,100	421,400	125,200	147,800
August	411,700	440,400	151,500	147,800
September	430,300	454,600	160,600	149,400
October	481,500	495,600	172,000	162,600

Ingots and Castings Production

	United Kingdom	France	Belgium	Luxemburg
Monthly average 1912..	566,000	363,000	206,000	79,400
Monthly average 1913..	639,000	385,000	202,300	109,000
Monthly average 1919..	658,000	179,000	27,400	32,000
Monthly average 1920..	754,700	250,200	101,300	49,000
Monthly average 1921..	302,100	254,500	65,000	62,300
1921				
January	493,400	263,700	119,100	70,800
February	483,500	259,600	98,400	62,000
March	359,100	246,900	96,300	19,700
April	70,600	252,600	108,700	57,100
May	5,700	240,400	62,800	56,100
June	2,700	240,800	54,200	61,000
July	117,200	219,500	26,900	57,100
August	434,100	228,600	27,800	55,100
September	429,300	232,100	34,000	76,200
October	405,400	255,900	41,900	81,800
November	443,800	272,700	46,200	69,900
December	381,000	297,600	63,200	80,700
Total for 1921.....	3,625,800	3,010,400	779,500	747,500
1922				
January	327,500	309,000	78,400	75,600
February	418,800	311,800	82,700	75,100
March	549,400	361,200	104,000	99,200
April	404,200	319,300	95,200	98,100
May	462,300	358,100	116,500	112,200
June	400,200	352,500	111,300	121,600
July	473,100	362,900	112,500	125,600
August	528,400	390,300	149,100	129,200
September	555,900	400,300	154,900	132,600
October	565,200	423,000	179,600	136,800

Imports

	United Kingdom	France	Belgium	Germany
Average monthly 1912..	166,400	16,400	87,000	27,300
Average monthly 1913..	185,900	12,900	68,900	25,000
Average monthly 1919..	42,400	113,100	44,400	.....
Average monthly 1920..	92,400	89,000	67,000	26,200
Average monthly 1921..	137,100	38,500	43,300	.....
1921				
January	157,800	44,200		
February	153,400	35,400	120,100	125,000*
March	156,100	33,900		
April	102,100	26,100		
May	81,900	31,700	95,500	36,000
June	84,500	20,700		42,100
July	103,600	30,300		45,100
August	141,500	16,100	130,600	61,200
September	206,100	27,900		79,800
October	172,800	19,800		96,600
November	169,200	20,700	168,000	54,300
December	117,000	128,000		56,300
Total for 1921.....	1,646,000	434,800	514,200	596,400*
1922				
January	88,700	36,600		68,200
February	64,600	55,800	139,000	66,900
March	63,800	67,300		105,700
April	59,900	89,100	32,400	129,000
May	60,900	41,100	62,400	154,300
June	52,800	73,200		137,700
July	55,900	54,800		182,900
August	80,100	40,300	129,700	181,800
September	70,600	50,000		175,000
October	90,600	.....	.....	.....

Exports

	United Kingdom	France	Belgium	Germany
Average monthly 1912..	400,600	41,500	124,500	482,400
Average monthly 1913..	414,100	48,200	128,800	516,900
Average monthly 1919..	186,100	19,400	14,500	.....
Average monthly 1920..	270,900	74,600	74,300	143,600
Average monthly 1921..	141,700	132,700	75,900	176,000
1921				
January	232,400	89,300		
February	166,900	125,800	294,000	503,600*
March	148,900	122,700		
April	160,100	117,400		.....
May	99,000	96,900	241,300	127,800
June	64,700	109,100		159,700
July	64,000	87,600		175,000
August	76,500	122,500	192,300	236,300
September	133,300	171,200		221,800
October	155,800	188,300		242,300
November	193,500	167,400	176,000	230,600
December	205,300	131,700		212,900
Total for 1921.....	1,700,400	1,529,900	903,600	2,110,000*
1922				
January	235,300	164,000		218,200
February	223,400	107,000	198,400	170,000
March	295,800	72,300		208,700
April	258,400	125,800	83,900	195,500
May	272,400	122,200	279,600	204,500
June	236,300	180,300		209,133
July	251,700	182,100		206,200
August	270,000	168,400	522,600	181,300
September	279,200	174,000		223,500
October	347,100	.....	.....	.....

Note—Belgian figures include Luxemburg since June 1, 1922.

*Provisional estimate. Export and import figures do not include scrap.

American Iron and Steel Exports and Imports

Gross Tons

	Imports	Exports
1922		
August	32,010	144,264
July	44,384	156,392
June	24,101	216,298
May	17,292	229,616
April	15,884	197,562
March	8,612	206,474
February	10,216	133,333
January	10,511	155,822
1921		
December	9,400	134,348
November	9,296	125,492
October	10,609	106,466
September	11,743	94,650
August	8,069	75,641
July	10,040	85,520
June	8,260	119,021
May	10,915	140,987
April	4,847	160,921
March	14,492	210,451
February	3,650	387,900
January	15,784	516,447
Total	117,105	2,156,818

1920		
December	15,120	499,780
November	50,995	434,290
October	39,797	451,972
September	31,825	408,605
August	58,335	431,519
July	32,742	419,230
June	40,549	392,780
May	29,123	419,064
April	29,681	393,583
March	38,377	426,448
February	36,491	308,128
January	45,796	333,514
Total	448,833	4,920,913
1919		
December	39,806	254,780
November	43,826	336,994
October	40,698	302,459
September	43,567	363,531
August	28,987	396,743
July	28,258	287,695
June	21,056	561,020
May	17,885	422,282

April	16,560	396,813
March	17,632	367,224
February	12,302	344,180
January	16,913	371,570
Total	327,490	4,403,281
1918	168,225	5,372,424
1917	324,565	6,442,240
1916	310,891	5,947,646
1915	282,396	3,532,564
1914	289,775	1,549,554
1913	317,260	2,745,635
1912	225,072	2,947,596
1911	262,457	2,187,725
1910	510,730	1,537,943
1909	363,984	1,243,583
1908	205,845	964,242
1907	662,358	1,301,981
1906	577,809	1,325,740
1905	416,000	1,010,255
1904	266,398	1,167,674
1903	1,178,797	326,590
1902	1,212,484	411,915
1901	221,297	81,211
1900	209,955	286,687